Cityscape

A Journal of Policy Development and Research

An Evaluation of the Impact and Potential of Opportunity Zones

Volume 24, Number 1 • 2022

U.S. Department of Housing and Urban Development Office of Policy Development and Research

PD&R

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Daniel Marcin
Government National Mortgage Association

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Introduction

Opportunity Zones (OZs) are the latest federal place-based tax initiative, created by Congress with the Tax Cuts and Jobs Act of 2017.

The essence of OZs is that investors with capital gains can defer taxes on them by reinvesting those gains into business or property in designated low-income census tracts, with the possibility of paying zero federal income tax on any additional capital gains realized from the new investment.

It is too early to issue a fair and full evaluation of Opportunity Zones as a program. OZs have attracted cheerleaders and skeptics, but rulemaking by the Internal Revenue Service (IRS) took several years after the program was enacted, and the impact on investment is still a matter for speculation. Furthermore, the structure of the tax incentive requires holding periods of 5, 7, and 10 years for the investor to realize the most attractive benefits of participation. These interim implementation reports may nonetheless benefit all readers who have an interest in place-based interventions.

Abstract submissions for this symposium were sought on the *Cityscape* website and through announcements in various relevant professional organizations. Thirteen promising topics were selected. Ten sets of authors sent a full draft and at least one revision.

The Law

Opportunity Zones are the first, but probably not the last, major tax code provision to arise out of the enormous growth in the technology sector—in this case, out of Napster and Facebook.[1] The Economic Innovation Group, an organization founded by internet billionaire Sean Parker, put out a paper by Jared Bernstein and Kevin Hassett in 2015 that gave a broad outline of how Opportunity Zones might work (Bernstein and Hassett, 2015). U.S. Senators Cory Booker (D-NJ) and Tim Scott

[1] History of Opportunity Zones. https://eig.org/opportunityzones/history.

(R-SC)[2] became the main boosters of legislation to create Opportunity Zones. The Booker/Scott legislation did not become law on its own but was added into HR 1[3] of 2017, also known as the Tax Cuts and Jobs Act (TCJA), by Senate amendment[4] after not appearing in the original bill.

Opportunity Zones allow investors with capital gains to reinvest that money into Qualified Opportunity Funds (QOF), which then invest in OZs. Doing so has three main benefits.

1. The capital gains tax due on the original investment sale is deferred until the sale of the QOF investment or the end of 2026, whichever comes first.

2. If the investor holds the QOF investment for 5 years, the cost basis of the investment is increased by 10 percent. If held for 7 years, or 2 additional years, the cost basis increases by an additional 5 percent.

3. If the QOF investment is held for 10 years, then no tax is due on any gains on the OZ investment (IRS, 2021a).[5]

For additional discussion of the provisions of the law, see the author's article in an earlier issue of *Cityscape* (Marcin, 2020) and the article by Blake Christian and Hank Berkowitz in this symposium.

With the legislative process completed, the next steps were the regulatory process and the designation process, which happened simultaneously.

The OZ statute required the IRS to draw new lines, both geographic and legal. The law says that investments in Opportunity Zone businesses, partnerships, business property, or stock are eligible for the law's benefits, but the IRS needed to clarify what it means to be an Opportunity Zone business or property. Consider two (absurd) extremes: (a) Should having one employee or post office box in one Opportunity Zone be enough to qualify for OZ benefits? (b) Should having one customer or employee outside an Opportunity Zone be enough to disqualify one from receiving the OZ benefits? The IRS ruled that, to qualify as an Opportunity Zone business, that business must earn at least 50 percent of its gross income from activity inside an OZ. That amount can be computed by either hours of work, dollar amounts of paid-for services, or tangible property (IRS, 2021b). Opportunity Zone business property must be used "substantially all" of the time in an OZ. The IRS gives an example of a landscaping property that is kept overnight in an OZ and then used during the day, sometimes in OZs and sometimes not; to qualify, "substantially all" of that use (at least 70 percent of the time) must be in OZs (IRS, 2021c).

[2] Opportunity Zones are frequently called "bipartisan" due to the cooperation of Democrat Cory Booker and Republican Tim Scott, but in the end, not a single Democrat voted for the Tax Cuts and Jobs Act in either the House (https://clerk.house.gov/Votes/2017699) or the Senate (https://www.senate.gov/legislative/LIS/roll_call_lists/roll_call_vote_cfm.cfm?congress=115&session=1&vote=00323#position), so that description is debatable.

[3] "H.R.1 - An Act to provide for reconciliation pursuant to titles II and V of the concurrent resolution on the budget for fiscal year 2018." 115th Congress (2017–18), Public Law 115-97, December 22, 2017. https://www.congress.gov/bill/115th-congress/house-bill/1/text/pl. This is the final public law version of TCJA.

[4] "H.R.1 - An Act to provide for reconciliation pursuant to titles II and V of the concurrent resolution on the budget for fiscal year 2018." 115th Congress (2017-2018), Engrossed Amendment Senate No: 115-97, December 14, 2017. https://www.congress.gov/bill/115th-congress/house-bill/1/text/eas. This version, amended by the Senate, features OZs, whereas the version introduced into the Senate does not.

[5] As with all tax regulations, uncommon exceptions to these broad rules likely occur.

After some initial guidance from the IRS but before the completion of the rulemaking process, each state and territory's executive (usually the governor) was empowered to select OZs within the state. Any "low-income community"[6] qualified, generally a census tract with (a) a 20-percent poverty rate or higher, (b) a median family income of 80 percent or less than the metropolitan median family income, or (c) if not located in a metropolitan area, a median family income less than 80 percent of the state median family income. Executives could also select some tracts contiguous to low-income communities as long as the tract's median income was not more than 25 percent higher than the adjacent low-income community; as long as both the directly qualifying and the contiguous tract were selected; and as long as no more than 5 percent of all designations in that state were contiguous zones.[7] Executives could select 25 percent of all tracts that were eligible, with a minimum of 25 in a state. In total, 8,766 OZs were designated (Community Development Financial Institutions Fund, n.d.).

For future evaluators of this program, a few intergovernmental complications are worth noting. First, OZ benefits are for federal capital gains tax. Most states align their capital gains taxation rules with federal rules; however, some states have moved to decouple from the IRS rules and not provide OZ benefits on any state tax due. Second, the federal government has made several investments of its own in OZs, either with explicit spending or prioritization of grant dollars (White House Opportunity and Revitalization Council, 2020). Thus, any researcher looking to evaluate the effect of OZs will have to pay attention to any confounding factors, such as different treatment across states or different levels of federal spending or investment in OZs compared with the tracts not selected.

Other Place-Based Policies

This is not the first place-based policy for economic revitalization. Previous efforts include the federal Empowerment Zones and Enterprise Communities and various efforts at the state level and internationally. Most other programs were "programs" in a way that Opportunity Zones are not; they had a qualification, application, and selection process, and the selected areas received federal block grant money. By contrast, Opportunity Zones provide direct benefits only to the investors. No direct payment or tax cut is provided to anybody working in an OZ, running an existing business in an OZ, or who already owns property in an OZ, although in theory, all of those people reap indirect benefits from a lowering of the cost of capital (for more information on those other incentives, see Marcin, 2019).

Featured Articles

This symposium begins with an article by Blake Christian and Hank Berkowitz, who provide a summary of how OZs work, detail on some of the more complicated topics, and advice on how states and localities can improve their approach to maximize benefits for their citizens. The authors

[6] "26 U.S. Code § 45D—New Markets Tax Credit." Cornell Law School, Legal Information Institute. https://www.law.cornell.edu/uscode/text/26/45D.

[7] "26 USC 1400Z-1." From Title 26-Internal Revenue Code, Subtitle A-Income Taxes, Chapter 1-Normal Taxes and Surtaxes, Subchapter Z-Opportunity Zones. https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title26-section1400Z-1&num=0&edition=prelim.

discuss esoteric provisions in simple language and draw clear comparisons between past law and current law and between prohibited investments and allowed investments. In particular, the reader can look to this article for a discussion and examples of how to pair the Low-Income Housing Tax Credit and other federal programs with OZs.

Next is a pair of articles on designations of OZs and missed opportunities or room for improvement in Baltimore and in Oregon, the first from Michael Snidal and Sandra Newman and the second from James Matonte, Robert Parker, and Benjamin Y. Clark. The authors of each article conducted dozens of interviews with a variety of OZ players, and each interviewee critiqued the actions of state or local government. These authors offer a series of constructive suggestions to elected officials and civil servants at all levels of government. Snidal and Newman advocate for the cancellation of OZ designation for several richer tracts; the expansion of OZ benefits to all investors, not just those with eligible capital gains; greater reporting requirements; and a greater role for Community Development Financial Institutions. Matonte, Parker, and Clark suggest that greater networking is needed between community advocates, investors, and governments, and that all players can contribute more to that effort. The authors note that these census tracts may suffer less from taxes on capital investment being too high than from the barriers to investment in people.

The next two articles cluster the OZs selected by the executives into groups based on common characteristics. The first is from Janet Li, Richard Duckworth, and Erich Yost of HUD and the second from Jamaal Green of the University of Pennsylvania and Wei Shi of Travelers Insurance. Only about 25 percent of eligible tracts could be selected, but what are some descriptive statistics on those tracts? Each paper uses principal components analysis to break down the set of OZs into just a few clusters. Li, Duckworth, and Yost categorize OZs into five broad categories: "rural, small-town, and tribal communities (35 percent of Opportunity Zones); underinvested majority-Black communities (26 percent); suburban majority-Hispanic families (19 percent); growing job hubs (13 percent); and metropolitan immigrant communities (6 percent)."[8] Green and Shi use employment data and the Census Neighborhood Deprivation Index to find nine groups of OZs, with two clusters appearing to be high-opportunity, high-employment, high-investment tracts, which were selected as OZs at higher rates than other clusters' tracts. This case study in Portland indicates that tracts with low need may have crowded more disinvested areas out of designation.

Some analysts treat OZs as simply a real estate investment tax cut. Yanling Mayer and Edward Pierzak examine the effect of OZ designation on single-family home prices by comparing the CoreLogic data between OZs and tracts that were eligible for OZ designation but not selected. With a difference-in-difference approach and a rich set of control variables thanks to the detailed CoreLogic data, the authors find that OZ tracts saw lower home price appreciation than did non-selected tracts before 2017. After 2017, however, OZ tracts had a 6.8-percent greater home price appreciation through 2020 over the eligible-but-not-selected tracts. Mayer and Pierzak also looked at the age of properties and hypothesize that older properties will more likely be investment properties; the authors' analysis confirms a larger premium for OZ designation for older properties.

An increasing focus of U.S. housing research is on *gentrification*. Haydar Kurban, Charlotte Otabor, Bethel Cole-Smith, and Gauri Shankar Gautam examine this trend in OZs in the District of

[8] Li, Duckworth, and Yost, this volume, page 75.

Columbia. The authors define gentrification as a greater-than-average change in the percentage of tract residents older than age 25 with a bachelor's degree. They compare business and residential vacancies against their gentrification measure and try to predict where investment will occur in OZs in D.C. With D.C. government data, the authors are able to analyze migration into and out of tracts across the city—in particular, they can identify the education level and income of the residents who are coming and going. Although D.C. as a whole is gentrifying at a positive rate, most OZs do not have a gentrification score higher than the city average.

Another increasing focus of social science is the relationship between the built environment and human health. Michelle Madeley, Alexis Rourk Reyes, and Rachel Bernstein describe efforts at the Environmental Protection Agency (EPA) to create communities with healthy economies, environments, and people through OZs. The authors led the creation of an OZ Mapper tool, which allows users to easily compare the EPA data against OZ designation and other publicly available data sources. For example, they show that 65 percent of OZs contain a floodplain, and 47 percent contain impaired water sources. The article tells a story of how EPA has used the OZ Mapper to customize its approach to investing in each community. Four examples show how OZs compare with brownfields, social vulnerability, walkability, flood risks, impaired waters, and food deserts. The authors have prepared additional resources that would help communities develop a prospectus, with the goal of maximizing the positive impact of investments in those areas.

Sara Harvey explores the possibility of pairing clean energy investments, in terms of both educating a new workforce and hardware installation, with OZs. The article examines existing anchor institutions and community solar installations and comes up with a series of recommendations for realizing the potential that OZs have for this industry.

Finally, practitioners may profit from Joseph Fraker's contribution, which looks at some recent local attempts to redraw census tract boundaries to expand the areas eligible for OZ investment. Although OZs were drawn based on census tracts as defined at the time of enactment of the TCJA in 2017, whether tract boundary changes would imply OZ boundary changes was not fully clear. After a period of confusion and attempts by interested parties to have their preferred areas drawn into existing OZs, regulators clarified that the boundaries of OZs would stay the same forever, even if the tract that they were based on changed its boundaries in 2020. Fraker reviews the history of the tract as a unit and presents details from a case study in Baltimore County, Maryland.

Future Research Needs

Researchers attempting national overviews of the OZ program in the near future will likely experience considerable frustration. Although IRS form 8996 requires much more granular information now than did the first draft—including the investment value by tract, specific business or property, and fund in each year—how much of that data the IRS will make available to researchers or the public is not clear at this point.

Because OZs do not have any formal stated goals or targets, many metrics will be employed by which to evaluate them. Backers of the program have called it an anti-poverty program or a racial equality program, and opponents have called it a gentrification program. Researchers will face the

typical challenges to determining program impact: designation is not random, states treat OZs differently, OZs are on different trend paths before designation, and federal and state governments are actively interfering in a clean evaluation by adding additional incentives or spending to some OZs. The country will owe a great debt to analysts who can overcome those challenges.

Acknowledgments

I would like to thank Alfonso Costa, Jr., every member of the HUD OZ Task Force and HUD OZ Work Group, Paige Esterkin, and Spencer Chretien for their work on OZs; Alastair McFarlane and Todd Richardson for their faith in me; Mark Shroder for guidance on this issue and all previous OZ publications; and Mike Hollar, Chelo de Venecia, Yves Djoko, Janet Li, Richard Duckworth, and Christian Kincaid for their cooperation. I would like to acknowledge the work of the Program Monitoring and Research Division for their assistance in many OZ mapping projects, especially John Huggins, Rob Renner, Alex Din, Jacquie Bachand, and Ted Payne. I thank Erich Yost for an infinite stream of OZ enthusiasm. I thank all of the authors of articles in this symposium for their efforts and for their patience with the process. I reviewed all papers myself, but I do thank Brian Stromberg for helpfully discussing one paper that was fairly far outside my area of expertise. Finally, I thank my wife for making telework easier, and I thank my wonderful daughter, who was born in an Opportunity Zone in 2020; whether this event was affected by the tract's designation is unclear.

Guest Editor

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Enhancing Returns from Opportunity Zone Projects by Combining Federal, State, and Local Tax Incentives to Bolster Community Impact

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Hank Berkowitz

The opinions expressed in this article are those of the authors and do not necessarily reflect the views and policies of HUD or the U.S. Government.

Abstract

Skeptics may call the federal Opportunity Zone (OZ) program a tax dodge for the wealthy, but there is strong bipartisan support for the program at the federal, state, and local levels. Furthermore, underserved communities (and the small businesses therein) could benefit from billions of dollars in new investments in long-term capital that they might not have received through conventional bank loans or government programs—especially given the current unique and challenging economy. The findings noted in this article are based on the authors' presupposition that President Biden's proposed tax increases have increased interest in the deferral and ultimate tax exemption aspects of the OZ program, and investment momentum is likely to continue for the foreseeable future.

The authors' data and interviews show that because the OZ program is not structured for real estate speculators and flippers to trade during the OZ reinvestment period, the long-term investment requirement of the OZ program makes it stand out from other place-based incentive programs that have generally failed to live up to expectations. Furthermore, the authors dispute the notion that the OZ program only benefits real estate investors. They believe that OZ investments have funded hundreds of clean energy projects, biotechnology and medical infrastructure projects, active businesses, solar energy projects, and many successful public-private partnerships.

Abstract (continued)

The authors also show that Congress placed no limits on the amount of federal, state, and local tax benefits, grants, or other incentives that can be layered into the OZ investment. As a result, OZ structures are being used in combination with Low-Income Housing Tax Credit (LIHTC) projects, New Market Tax Credit (NMTC) projects, Historical Tax Credit (HTC) projects, research and development, solar energy, cost segregation, and other alternative energy projects that generate accelerated depreciation and credits. This is generally referred to as "twinning" of various tax programs.

The authors anticipate further extensions of the OZ investment window that will give taxpayers and fund managers sufficient time to make important investment decisions that result in significant economic impact for underserved communities. How many other economic development initiatives can generate win-win results for underserved communities, municipalities, small businesses, and investors alike?

Introduction

The federal OZ program is arguably one of the most flexible, impactful, and bipartisan tax programs for helping disadvantaged communities in half a century. Although the OZ program was bundled into the landmark Tax Cut and Jobs Act (TCJA) passed in late 2017, the OZ program architects had developed the program's framework years earlier with support from the Obama-Biden Administration, as outlined in a 2015 report by the Economic Innovation Group, "Unlocking Private Capital to Facilitate Economic Growth in Distressed Areas" (Bernstein and Hassett, 2015).

Skeptics call the OZ program a "tax dodge" for the wealthy, but there is strong bipartisan support for the program at the federal, state, and local levels. Investment commitments appear to be ahead of schedule. More importantly, the OZ program is creating new businesses, jobs, and affordable housing at a time when the pandemic-ravaged economy has been particularly cruel to minorities and low-income communities.

Researchers from the University of Wisconsin-Madison, Rutgers, and the University of North Carolina found that the OZ program has indeed had a positive impact on job creation (Arefeva et al., 2021). Using establishment-level employment data for 2015 to 2019 from Your-economy Time Series, a database tracking private and public institutions and their jobs, the authors discovered that the OZ program increased employment growth by 2.5 percentage points and establishment growth by more than 2 percentage points.

Today, nearly 8,800 census tracts in all 50 states and most U.S. territories are eligible for OZ investment into real estate projects and operating businesses. Not all tracts have received funding, but according to the White House Council of Economic Advisors (CEA), among other sources, an estimated $75 billion of OZ capital had been committed to Qualified Opportunity Funds (QOFs) by year-end 2020 (CEA, 2020). Granted, the CEA estimate is partially based on extrapolated data, but even the widely followed Novogradac Opportunity Zones Investment Report (Novogradac, 2021) stated that more than $15

billion in equity capital had been committed to the OZ program by year-end 2020—up 20 percent from August 2020 alone, and those numbers are conservative. Novogradac concedes that it tallies commitments only for the minority of QOFs that report their equity amounts.

The pages that follow indicate that the true level of OZ investment may be closer to the White House's CEA $75 billion estimate. That is because a typical real estate project has a 4:1 ratio of debt to equity. Thus, a $75 billion equity investment in QOFs will likely be coupled with an additional $300 billion of debt in what developers call the "capital stack." Considering highly volatile stock, real estate, and cryptocurrency markets experienced since COVID-19 surfaced in early 2020, there are billions of dollars' worth of 2020 gains that had a reinvestment window as late as September 10, 2021, under the liberal "180-day" rule—which can actually be as long as 20 months under certain circumstances.

Taxpayers had to meet a key deadline of December 31, 2021, to obtain the 10-percent basis step-up, which would reduce their reportable gain on December 31, 2026—absent a legislative extension.

Regardless of which figures are used to track adoption of OZ investment, the 3-year-old program is well on its way to meeting the 10-year, $100 billion investment goal set by program organizers. Despite an uncertain economic future caused by the pandemic, substantial new investment into QOFs continues as investors, financial advisors, and municipalities learn more about the OZ program. In fact, adoption may accelerate because interest rates and long-term capital gains taxes could rise for the wealthy under the Biden Administration.

Quick Example of OZ Mechanics

As other experts in this symposium may have mentioned, the OZ program allows investors to defer paying taxes on their capital gains for up to 7 years if they timely reinvest those gains in qualifying OZ projects. Until the OZ program surfaced 3 years ago, investors could generally only defer gains from real estate and certain stock investments—and only if they reinvested those gains quickly into similar (such as "like kind") property. Now gains from all types of investments—even from cryptocurrency and collectibles—can be reinvested tax advantageously into QOFs, which can reinvest that money into a wide variety of diversified asset classes as long as the investor remains patient. Furthermore, investors receive a mid-investment step-up in basis, saving them potentially 10 percent more—and any gains resulting from their reinvested monies are fully tax-free if they hold their investments in place for the full 10-year period.

If tax rates for capital gains and regular income go up during the Biden Administration, the OZ program will become even more attractive for investors seeking a holding place for their gains because the stock, cryptocurrency, and real estate markets could remain volatile near-term (Christian and Darby, 2021).

Matching Investor Incentives with Community Development Needs and Timing

Under current law, capital gains generated through December 31, 2026 can be reinvested into a QOF as late as September 10, 2027. In February and August 2021, however, bipartisan Representatives Tim Burchett (R-TN) and Henry Cuellar (D-TX) introduced the Opportunity Zone

Extension Act of 2021 (Office of U.S. Representative Tim Burchett, 2021), and Representatives Burgess (R-UT), Steele (R-CA), Salazar (R-FL), and Gimenez (R-FL) introduced the Growth and Opportunity Act (H.R. 4608) in July 2021 to extend the deadline for reinvesting gains by 2 years to December 31, 2028, from the current of December 31, 2026 (Utah Policy, 2021). Such an extension, which continued to have strong bipartisan support as this article went to press, will further benefit investors. That is because a QOF investment funded by December 31, 2021, would now have the opportunity to meet the 7-year holding period by the December 31, 2028 recognition date—thereby receiving the full 15-percent basis step-up. The Burgess bill, still pending at press time, would also allow new OZ census tracts to be designated every 10 years, dramatically extending the program.

Real World Example

By meeting the 7-year holding requirement, OZ investors would see their tax basis increase to 15 percent (it is 10 percent after 5 years) when they report their deferred gains. For example, if an affluent real estate investor sold a property in late 2020 for $1 million and it had cost her only $300,000 to purchase the property years ago, she would have to report a long-term capital gain of $700,000. At her high-net-worth tax bracket, she would owe 23.8 percent of that gain at the federal level ($166,600).

The investor will not want to reinvest her entire $1 million gross proceeds into a QOF as equity because only $700,000 will receive the aforementioned OZ program benefits. She can, however, place the remaining $300,000 into the project as a loan. Assuming the deferred gain recognition date gets extended to 2028, and she makes her QOF equity investment by December 31, 2021, if she holds that investment for 7 years or longer by the recognition date, her tax basis would be raised 15 percent to $105,000. Thus, her taxable gain would be reduced to $595,000 from $700,000. At current federal rates, her tax liability would be reduced to $141,610 from $166,600—a savings of nearly $25,000.

All but five states—California, Massachusetts, Mississippi, New York, and North Carolina—are fully conforming to the OZ program at the state level. Only Massachusetts limits OZ benefits to C corporations, not to S corporations, partnerships, or individuals. Otherwise, adoption of the OZ program has been swift and widespread.

In January 2021, the Internal Revenue Service (IRS) issued IRS Notice 2021-10, which gave taxpayers until March 31, 2021, to invest certain 2020 gains (IRS, 2021; in some cases, taxpayers could even invest section 1231 gains from 2019; Christian and Darby, 2021). The extra time to invest and improve property clearly attracted additional investment dollars to the OZ program.

OZ is Not Just for Real Estate Projects

Regulations have expanded application of the OZ program to energy projects, infrastructure, active businesses, and public-private partnerships. The aforementioned energy projects are just the tip of the OZ iceberg. According to the Economic Innovation Group (EIG), there are nearly 300 entrepreneurship incubators or accelerators in OZs (EIG, n.d.). One of the authors has worked

with a number of OZ incubator platforms, including Long Beach Accelerator (for which the author was a founding board member) (Munguia, 2019); Hall Labs, a Provo, Utah-based family office and tech accelerator that has been operating within an OZ for decades; and Conscious Venture Labs in Baltimore, Maryland.

EIG research found that numerous clean energy projects are also taking root in OZs. For instance, there are approximately 475 solar energy installations producing more than 1MW of activity in OZs, as well as 127 wind farms and 15 battery plants of at least the same capacity. The firm of one of the authors is involved with at least six large solar projects—with many more solar projects in the discussion stage.

Who Is Being Served by the OZ Program?

In a nutshell, underserved communities (and small businesses therein) are seeing billions of dollars of new investment in long-term capital that they might not have received through conventional bank loans or government programs—especially in this difficult economy.

Some media outlets like to focus their criticism of the program on a small number of OZ projects located in upscale neighborhoods, such as the Los Angeles Arts District, Chapel Hill in North Carolina, and Hell's Kitchen in New York City. Controversy boosts ratings and readership, but in most cases, the OZ program is targeting underserved communities. An Urban Institute analysis of the designated OZs showed that, overall, OZ tracts have a median household income (HHI) of roughly $33,000—much lower than the $44,000 for eligible nondesignated tracts and the $60,000 median HHI for all U.S. census tracts. Each state governor can designate which census tracts within their borders receive OZ designation, but designated OZ tracts to date have overall poverty rates of nearly 32 percent (compared with 21 percent for eligible nondesignated tracts and 16 percent for all tracts). Furthermore, those OZ-designated tracts have an average unemployment rate of 13 percent (compared with 9 percent for eligible nondesignated tracts and 8 percent for all tracts).

Bottom line: The OZ program is not for "flippers" and other real estate speculators. It is for long-term investors who are willing to make multiyear commitments to disadvantaged communities. As mentioned earlier, OZ equity investors must be willing to keep their capital invested for at least 5 years to earn a 10-percent reduction in their tax liability, and they must hold for 7 years to receive a 15-percent reduction in their capital gain. In addition, 90 percent of assets held in a QOF must be invested in qualified OZ property (QOZP) at all times—a threshold that is monitored semiannually by the fund manager. It is not enough for investors and QOFs to acquire property in underserved areas. They must also *substantially improve* that property, or it will not qualify for favorable tax treatment.

"Substantial Improvement" Requirement

For property that has previously been depreciated, taxpayers must generally double its tax basis or allocable cost during the first 30 months of ownership simply to satisfy the "substantial improvement" test. Although neither raw land nor ground-up development needs to meet the substantial improvement rule, any property containing existing structures that have been

depreciated is subject to the substantial improvement test. For a property to be considered substantially improved, there must be evidence showing that during any 30-month period (beginning after the property is acquired), additions to the basis of the property exceed an amount equal to the adjusted basis at the start of the 30-month period.

Note that IRS Notice 2020-39[1] *and* IRS Notice 2021-10[2] *suspended the Substantial Improvement period through March 31, 2021, due to COVID-19's ongoing business disruption—and it may get suspended again.*

Minimal Red Tape and Self-Certification

The OZ program was designed to expedite the formation and funding of projects and to minimize federal government interference. Rather than having taxpayers and investors jump through hoops trying to get projects approved, the OZ program architects implemented a "self-certification" process. A QOF simply completes IRS Form 8996[3] and files it with its first year QOF return and subsequent year filings. The statute and regulations provide relatively simple oversight, and the program is self-policing. Investors who meet the requirements do not have to submit endless applications or wait on a protracted government approval process.

Combining Other Statutory Tax Incentive Programs with the OZ Program ("Twinning")

Another interesting facet of the OZ program is that Congress placed no limit on the amount of federal, state, and local tax benefits, grants, or other incentives that could be layered in. Therefore, we are seeing OZ structures used for Low-Income Housing Tax Credit (LIHTC) projects, New Market Tax Credit (NMTC) projects, Historical Tax Credit (HTC) projects, research and development, solar energy, and other alternative energy projects that generate accelerated depreciation and credits. This is generally referred to as *twinning* of programs. There are even some OZ projects that incorporate QOZ-situated oil and gas projects that can generate myriad other tax incentives.

All the tax credits referenced previously, as well as other tax benefits available to specialized projects such as these, can be combined with the already powerful OZ program to attract additional private investor funds. Doing so means more funding for deserving projects and even higher potential return for investors in terms of after-tax return on investment (ROI). Although seldom discussed, the OZ program does not require these credits or depreciation amounts to be recaptured into the taxpayer's income upon sale when they are wrapped into a QOF Qualified Opportunity Zone Business (QOZB) structure. That provides another layer of ROI.

Some people confuse the OZ program with the federal NMTC because many of the OZ provisions borrow from the NMTC statute; however, the NMTC is much more difficult to navigate. It is primarily a debt-focused program and is generally not well suited for investments other than for

[1] IRS Notice 2020-39 can be found here: https://www.irs.gov/pub/irs-drop/n-20-39.pdf.

[2] IRS Notice 2021-10 can be found here: https://www.irs.gov/pub/irs-drop/n-21-10.pdf.

[3] The form is here: https://www.irs.gov/pub/irs-pdf/f8996.pdf.

large real estate projects and limited non-real estate operating businesses. By contrast, the OZ Program permits investment in a wider array of operating businesses as long as those enterprises are not "sin" businesses, such as liquor stores, hot tub facilities, and private golf clubs (IRC §45D).

A favorite twinning project of one of the authors is a startup company called ClearSkies, which installs solar farms on regional airport properties. ClearSkies strives to lower the energy costs for the developing electric airplane industry—a rapidly evolving sector. Approximately 10 percent (479) of the 5,000 public use airports are located in OZ census tracts, according to a tabulation provided by Southern Sky Aviation.

ClearSkies brings together all elements of an impactful OZ project, including alternative energy, support for a new industry, and job creation. Meanwhile, investors benefit from the recently extended 26 percent solar tax credits, bonus depreciation asset expensing, and an OZ deferral and exemption. Projects such as Clear Skies produce some front-loaded tax benefits and compelling after-tax internal rate of return for investors, all while supporting alternative energy for a new industry.

Non-Statutory/Negotiated Tax Incentives: State and Local Taxes

In addition to statutory place-based incentives such as NMTC, Empowerment Zones, Enterprise Communities, and Renewal Communities, most state and local jurisdictions offer "negotiated" incentives geared toward new businesses, relocating businesses, or expanding businesses. Benefits can often be negotiated by the taxpayer based on job creation, capital investment, or other economic factors.

Other somewhat common negotiated incentives include payroll tax, sales tax, and property tax exemptions, and holidays for limited time periods. These exemptions can be very attractive incentives for companies seeking to relocate. Amazon's "HQ2" regional headquarters search is a perfect example of how large corporations use their clout to reduce future taxes. Smaller companies are often unaware of these incentives. Some incentives are statutory, and others must be negotiated with the city, county, or state. Making businesses aware of those incentives can be highly beneficial for the company, the municipality, and job seekers therein. Speaking with the applicable economic development group at the government level or hiring a CPA firm that specializes in these matters will often clarify these incentives.

Unlike other place-based programs, the OZ incentive has no cap. As mentioned earlier, QOFs can self-certify, which eliminates some of the regulatory burdens and obligations that hindered earlier programs. Unlike historical place-based programs, OZs do not combine tax benefits with grants, although localities may target other grants, such as Community Development Block Grants (CDBGs) and CDBG-Disaster Recovery, in their OZs. Some of these differences reflect insights derived from experience. The regulatory flexibility incorporated into OZs reduces barriers that the OZ architects believed impeded broader participation in other place-based programs. Furthermore, the absence of a cap on OZ investments removes an additional barrier that restricts greater investment into the most challenged communities.

Although the OZ program already offers significant federal benefits to incentivize investors, numerous projects may not "pencil out" even after generous federal tax breaks are considered. In addition, many deserving projects are in census tracts unfamiliar to many developers, entrepreneurs, and investors. As a result, state and local economic development personnel must find ways to attract OZ projects to their jurisdictions.

One of the authors, a CPA, rarely goes a day without receiving at least one call or email from someone asking about solid OZ projects to invest in—or which state or city is the best place to make OZ investments. With a few exceptions—such as Riverside County, Long Beach, and Santa Ana, California; the state of Ohio; Erie, Pennsylvania; and rural Colorado—very few jurisdictions are aggressively promoting their OZ investment opportunities. So far, most do not do more than mention the OZ program on their websites as part of their economic development outreach. That said, these state and local agencies still have time to build a low-cost, high-impact OZ program. Here are five good ways to do so:

Five Ways that State and Local Agencies Can Assist the OZ Program, Communities, and Investors

1. **Form OZ advisory committees.** States, counties, cities, and tribal lands need to form OZ Advisory Committees composed of selected internal staff members (such as economic development, planning and permitting, finance, and city/county council staff), as well as private industry members from real estate, business incubators, law firms, and accounting firms. In addition to forming committees, larger cities should consider adding an OZ ombudsman to fast-track every viable OZ project within their borders and should consider reducing, deferring, or waiving permits and fees.

   Advisory committees can develop strategic plans to get the word out to the local and national business community that their jurisdiction is "open for OZ business." Investors can make OZ investments in any state, the vast majority of counties and cities in highly populated states (which have more OZ census tracts), and even higher percentages in U.S. territories, such as Puerto Rico, U.S. Virgin Islands, and Guam. OZ advisory committees can provide case studies showing the OZ successes in their region and develop social media campaigns around their OZ success and OZ resources. Their investor audience is not just local but truly national.

   An early example of this approach is the Fresno DRIVE Initiative, in which a 300-member steering committee set clear priorities for an inclusive and sustainable 10-year investment plan in the greater Fresno, California, region. In the authors' opinion, the initiative significantly streamlined the development process for Fresno's OZ plan.

   Cities with other federal designations, such as Promise Zones, should check where their Promise Zones and OZs may be overlapping. In San Diego, for instance, the OZ boundaries and Promise Zone boundaries are nearly identical. These overlapping neighborhoods have a head start over other areas because they may have already undertaken organizing and planning efforts. As a result, they can use the OZ incentive to *supercharge* their economic development plans. For cities that are early in the OZ process, Promise Zone incentives are a great template

to follow. The upside potential is huge when stakeholder priorities, policies, and development incentives are properly aligned.

2. **Promote OZ properties in their districts.** Governors, mayors, city councilmembers, and economic development personnel should be inventorying and promoting their OZ properties—whether raw land, commercial, office, or residential—that is available for lease or purchase. Municipalities should also verify the condition of the properties so investors can easily determine the degree of substantial improvements required.

   Because many municipalities were slow or have not been very proactive about raising the profile of OZ properties within their districts, potential developers and investors are looking for proverbial needles in the haystack. However, it shouldn't be hard for municipalities to assemble databases of properties available for OZ investment. In many cases, local commercial realtors will help compile these databases because they are equally incented to find investors.

   Riverside, California, is an example of a municipality that has been very proactive about raising awareness of OZ properties within its borders. Opportunity Riverside, which lists properties available for sale or lease in an OZ on Zoom Prospector, also has layers to show where all available place-based incentives overlap. Riverside worked with the county to create detailed overviews of Riverside's OZ communities—and most importantly, local incentives and favorable zoning—to direct potential developers and investors to the desired areas and projects that would be most desirable to the community.

   To maximize OZ benefits, the authors recommend that local leaders determine which areas within their borders are willing to be placed into a special incentives district and determine which incentives make the most sense to include. Those incentives could include Tax Increment Financing (TIF), density bonuses, parking concessions, expedited review, or a mix thereof.

   Local government economics and public finance advisor Larry Kosmont of Manhattan Beach, California-based Kosmont Companies, serves nearly 100 public entities, many of which have multiple OZ areas. Larry told the authors recently that when it comes to attracting new investment to a community, one of the most compelling benefits of the OZ program is that it can be "accelerated and leveraged" when a public agency "doubles down on OZ by wrapping those areas with other local incentives." Kosmont added that an OZ is especially effective when a city has concluded that additional incentives "will generate improved results and public benefits."

3. **Approach local owners who have been unwilling to sell their properties to see if they are open to partnering on projects.** For example, raw land owners might consider entering a long-term ground lease or partnering with developers. There may also be opportunities to develop public-private partnerships to develop community centers, homeless shelters, workforce housing, trade schools, solar farms, urban farms, and so forth. Another approach is to contact recent property sellers who may have triggered capital gains within the past 6 months to find potential QOF investors. With this two-pronged approach, a marketplace for local development can be created entirely from within the community.

4. **Seek discounted advice from socially motivated CPAs, attorneys, and other OZ advisors.** There are many project developers who have excellent ideas but who lack the financial resources to hire knowledgeable attorneys and CPAs to guide them through the OZ formation and operation process. Therefore, cities, counties, and states should evaluate ways to provide micro-grants or loans to OZ project promoters who meet certain economic criteria. Furthermore, those amounts could be paid directly to attorneys, CPAs, and other OZ advisors to get projects kicked off. The service providers, however, would need to agree to perform the start-up services at 50 percent of their standard rates.

   Participating government agencies and service providers could then be repaid for the grants, loans, and discounted fees when the project is funded by OZ investors, making the support programs sustainable for other projects.

5. **Raise awareness of tax incentives at the state or local level.** State and local jurisdictions can often provide state- or local-level tax incentives to OZ projects in areas, such as the following:

   - State tax credit as a percentage of the QOF investment.
   - Payroll tax credits for jobs created by the QOF and QOZB.
   - Job training grants for new employees.
   - Equipment credits or sales tax exemptions for qualifying equipment placed in service in the OZ.
   - Property tax exemptions or TIF programs.

Examples of state and local incentives that the authors think work:

- The City of El Cajon, California, is currently evaluating the potential for TIF and other incentives within their various OZs. Santa Ana, California, is in the process of considering entitlement support for key projects.
- The Ohio Opportunity Zone Tax Credit (OOZTC) illustrates a prime example of combining state and local incentives with the federal OZ benefit. The additional Ohio credit provides a nonrefundable tax credit against individual income tax equal to 10 percent of the amount of funds invested by the Ohio QOF in QOZP located in one of the 320 designated Ohio OZs. Qualifying taxpayers can earn up to $1 million in tax credits for eligible investments.

The Erie (Pennsylvania) Downtown Development Corporation (EDDC) convinced a Fortune 500 firm, Erie Insurance Company, to provide $58 million in qualified capital gain equity to invest in a local QOF (including $8 million earmarked for Pittsburgh). This has contributed to the revitalization of multiple downtown properties in a struggling market—a great example of local government leveraging relationships with local business leaders (for more about this revitalization effort, see Martin, 2020).

- In Colorado, the state Office of Economic Development and International Trade has launched an OZ Accelerator Program in which the Colorado Center for Innovation for Community Capital has helped 12 local businesses in disadvantaged areas with their technology and business plans. Additionally, the center has facilitated connections to Colorado OZ investors, thus opening the door to a new funding source. These actions ultimately led to a national OZ fund that is dedicated to investing in rural startups and to investing in a new aerospace industry firm called Proximity Space (Kiser, 2020).

Cities and counties commonly own land at the government agency entity level. Rather than owning land at the entity level, they should consider contributing city- or county-owned land to appropriate OZ projects. For example, municipalities can contribute the land in exchange for an OZ fund's commitment to build a community center on the land. The city or county could enter a long-term lease on the building with a purchase option.

Yes, Public-Private Partnerships Can Work

Public-private partnerships (P3) are well suited for the OZ program because government projects are usually long term and OZ investing requires "patient capital." As mentioned earlier in this article, the Biden Administration will likely expand the use of the OZ program to capitalize on infrastructure and P3.

The OZ program has attracted widespread support among mayors, city managers, and county executives as both a tax-saving tool and as an economic development tool. One of the authors (Blake Christian) is working with various California counties, cities, universities, and incubators to use the OZ program to attract investment and to develop P3 arrangements.

Incubators help city governments and universities provide platforms for early business development. Informed advisors can encourage their team to layer in the OZ benefits to attract OZ equity dollars and debt financing into the business ventures. This model can be replicated throughout the country.

One such firm experienced in OZs and other sources of capital from a business perspective is Blended Impact Labs, based in Riverside, California. Blended Impact Labs has worked with the U.S. Department of Housing and Urban Development (HUD), the California Governor's Office, and others on OZ strategy and implementation at the local level.

Stacy Cumberbatch, managing director of Blended Impact Labs and founder of Opportunity Riverside, noted in an interview for this article that she finds OZ capital exciting due to the "patient nature" of OZ incentives, the flexibility of sources, and the creativity used to structure custom terms. "OZ capital can be a powerful financing tool, particularly in rural communities," Cumberbatch said. "It's also effective for expanding ventures for those that embrace it, growing both entrepreneurship and job opportunities within communities," she added.

A relevant example would be a local city government interested in developing a new cogeneration plant, water-treatment plant, or events center on vacant land that it owns. If that land is located within an OZ census tract, the project becomes even more attractive. The city can partner with

an OZ fund and have the fund build and own the project, which entitles the fund to claim depreciation. It is worth noting that leases to government organizations preclude certain bonus depreciation and other accelerated depreciation—but, as previously discussed, the depreciation is not "recaptured" as taxable income by the investors after 10 years.

With proper planning and drafting, the parties can even institute "put" and "call" options that allow the project to be transferred to the cosponsoring municipality after 10 years. Furthermore, the fund might even agree to structure an "installment sale" at the end of the investment term to provide financing to the municipality. This assures investors with nearly guaranteed ROI before breaking ground and secures desired projects with built-in financing for municipalities.

Diffusing OZ Skeptics

QOFs are also partnering with universities because many university neighborhoods contain a high percentage of students who technically meet the OZ program's low-income threshold. For a census tract to qualify as a QOZ, two basic low-income requirements must be met:

1. There must be a poverty rate of at least 20 percent.
2. The median family income must be less than 80 percent of the statewide (or relevant metropolitan) median family income.

The following is an explanation of why these criteria are not bending the rules but instead making smart use of P3.

698 Prospect Phase I is a student housing, commercial, and retail development adjacent to the University of North Carolina Pembroke. Pembroke is a Native American-founded university that serves primarily low-income students. The project will create housing for nearly 200 students, more than 50 full-time equivalent jobs, and 30-plus construction jobs, and it will generate almost $3 million in wages in Pembroke. That is a substantial win for a small, economically distressed rural town that is the political, economic, and cultural center of the Lumbees, the largest Native American tribe east of the Mississippi.

In the non-real estate arena, a sampling of QOF-university projects includes very early-stage biotech research projects, aerospace initiatives, and tech or software projects that might not have received funding via traditional bank and venture capital sources. There are a growing number of incubator platforms used primarily for non-real estate projects.

For example, Agile Space Industries, a small aerospace company based in the small town of Durango, Colorado (home to Fort Lewis College), is creating 50 jobs directly and more than 200 jobs indirectly (Mullane, 2021). The investment will enable Agile to attract highly skilled engineers to Durango. This, in turn, will spur local economic activity and further contribute to the diversification of the town's economy, which had been heavily reliant on tourism and oil and gas before COVID-19. Agile is committed to training and hiring residents and will train two dozen members of underrepresented populations over the next 4 years. In fact, more Agile employees have graduated from Durango's Fort Lewis College than from any other college or university.

As with any community development program, there are concerns about OZ-induced gentrification, property tax hikes, minimal transparency, and minimal oversight. A widely cited 2019 New York Times article outlined how investors were reaping breaks on projects that were already underway or that only served well-off communities. More recently, a critical NBC News report neglected to cite facts from the Organisation for Economic Co-operation and Development (Strickler and Alexander, 2020). The Urban Land Institute also released a June 2020 report critical of the program's shortcomings (Theodos et al., 2020).

What each of these detractors overlooked was the fact that the 3-year-old OZ program is still in the early stages of its 10-year planning horizon. In the authors' opinion, rational observers would say the program is ahead of schedule—even more encouraging when one considers that three sets of complex OZ regulations were not finalized until December 2019, 24 months after the program was launched. Then COVID-19 created additional investment delays beginning in early 2020. Real estate projects generally take at least 2 to 4 years to complete after factoring in the entitlement process and construction time.

Bottom line: Expecting the OZ program to show significant community impact after just 30 months is highly unrealistic. But if the program's early wins continue at the same trajectory as the investment capital committed, the authors think that the program should far exceed its initial goals when the 10-year planning horizon ends later this decade. As mentioned earlier, independent research confirms the OZ program—even in its infancy—has had a positive impact on job creation (Arefeva et al., 2021; CEA, 2020; Novogradac, 2021).

Author's Experience as an OZ Business Owner and Investor

One of the authors, Blake Christian, has specialized in place-based tax incentives for most of his career. He has promoted economic development through various public-private partnerships, including leadership board positions with various chambers of commerce and CalOZ, a nonprofit trade organization dedicated to maximizing the transformative potential of OZs in California. He has also consulted to various states, counties, and cities about the OZ program. When the OZ program surfaced in early 2018, he received frequent questions about the new "OZ credits." He spent a great deal of time explaining that the OZ program was not a tax credit program but something, in his opinion, much more powerful, flexible, and beneficial to communities in need.

He has helped establish approximately 85 QOFs nationwide and a larger number of QOZBs. Roughly 70 percent of his OZ projects are real estate developments, and 30 percent involve operating businesses located in one or more OZ census tracts.

Projects range from as small as $1 million to as large as $6 billion, and the fund equity in those projects ranges from $250,000 to $120 million. Real estate projects range from manufacturing facilities to multifamily rentals, office buildings, a casino reuse project, mixed-use developments, and medical/tech facilities. Operating businesses range from COVID-19 research, a COVID-19 disinfectant company, manufacturing, agricultural, mining, solar projects, pharmaceutical companies, technology, wholesale, and retail.

He is also establishing an OZ manufacturing facility in Provo, Utah, for a business that he started several years ago. Park City Base Camp and Gorilla Design repurpose shipping containers into affordable housing units for the area's homeless population and seasonal workers, among others. The entities have formed a new QOF that will operate under the name of Modular Innovation Technologies in the Provo, Utah area. It is important to know that existing businesses can be started, purchased in, or relocated into an OZ census tract and obtain full OZ tax benefits with proper planning.

Conclusion

The authors anticipate further extensions of the OZ investment window that will give taxpayers and fund managers sufficient time to make important investment decisions that result in significant economic impact for underserved communities. How many other economic development initiatives can generate win-win results for underserved communities, municipalities, small businesses, and investors alike?

> *"Creating a stronger, fairer [society] begins with expanding opportunity equally across all communities; the Opportunity Zone Program will be a vital resource in stimulating long-term economic growth and investment in cities and towns that need it most, and more importantly, in generating economic opportunities for our residents."*
>
> **– Phil Murphy, Governor of New Jersey**

> *"Opportunity Zones are an exciting new tool for building economic development in underserved communities. These grants will help guide us as we implement the program to maximize the benefits of job creation and neighborhood improvement in the most vulnerable areas of our city."*
>
> **– Keisha Lance-Bottoms, Mayor of Atlanta**

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Missed Opportunity: The West Baltimore Opportunity Zones Story

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Abstract

This paper presents a qualitative evaluation of how Opportunity Zones (OZs) have attracted capital and economic development to highly distressed neighborhoods in West Baltimore. Based on 76 interviews with community and government officials, program managers, developers, businesses, and fund managers, we assess the strengths and weaknesses of OZs in West Baltimore and Baltimore City. We find that OZs are stimulating new investment conversations and building local economic development capacity. However, we also find OZs fail at oversight and community engagement, do not spur new development, and are a missed opportunity to incentivize actors and institutions critical to revitalizing distressed neighborhoods. To spur development in distressed neighborhoods, OZs require reporting standards, the removal of non-distressed census tracts, dollars for education and infrastructure, the incorporation of Community Development Financial Institutions, and incentives for non-capital gains holding investors.

Introduction

The stated goal of Opportunity Zones (OZs) is to bring economic development to distressed communities.[1] Broad selection criteria, flexible development guidelines, and lack of reporting requirements, however, have provoked concern that OZs may fail to spur investment in truly distressed neighborhoods (Gelfond and Looney, 2018; Theodos, Meixell, and Hedman, 2018).

This report presents the findings from 76 interviews with community and government officials, program managers, developers, businesses, and fund managers regarding OZ investments in the West Baltimore OZ Cluster, a grouping of 11 highly disadvantaged census tracts representing over

[1] On the goal of Opportunity Zones, see the published transcript of "The Promise of Opportunity Zones," Senate Hearing 115-297 before the Joint Economic Committee.

40,000 residents. These interviews were used to assess how OZs are supporting specific real estate and business investment projects in distressed neighborhoods.

We find that OZs are a missed opportunity. OZs are stimulating investment conversations and local government capacity; however, they are failing at oversight and community engagement, and they are not changing development outcomes. Participant interviews reveal a locality doing its best with a tax policy poorly designed to stimulate development in distressed communities. OZs are failing West Baltimore because they are a weak incentive for capital gains investors who want market-rate returns, because they do not sufficiently support investors and developers already active in distressed neighborhoods, and because of several related design flaws.

In the next section, we review previous evaluations of tax preferences for place-based development. In the methodology, we discuss the case study area, the case study strategy, and the interview and data collection process. We then summarize Baltimore OZ investments and describe the major findings from our participant interviews. We end with seven recommendations to improve OZ policy for distressed neighborhoods.

Evaluations of Tax Preferences for Place-Based Development

This is one of the first evaluations of OZ outcomes.[2] Tax incentives to attract mobile capital to distressed communities, however, have been advanced by all levels of government for over half a century. By the 1980s, most states had implemented Enterprise Zones (EZs), offering tax incentives and employment credits for investment and job creation in distressed areas. In 1993, the federal government established the Empowerment Zones program: a combination of tax credits, grants, bonding authority, and other benefits eligible in distressed urban and rural communities. These programs are the direct predecessors to OZs. Assessments of their outcomes are inconsistent and inconclusive.

Econometric studies of these programs have generally found nominal net benefits of both state-level EZ programs and the federal Empowerment Zones program. For example, Boarnet and Bogart (1996) found that EZ designation had no significant effect on employment or property values in New Jersey; Engberg and Greenbaum (1999) found that EZ designation had no effect on housing prices across 22 states; and the Government Accountability Office (GAO) (1988) found that EZs had little or no effect on job creation in Maryland. In the most exhaustive study, Peters and Fisher (2002) found that EZs in 13 states had little effect on economic growth. Positive effects that are documented tend to be found in less distressed areas.

In contrast, Papke (1994) found that EZ designation in Indiana resulted in an 8-percent increase in company inventory value; Greenbaum and Engberg (2004) reported that EZ programs across six states led to increased business development; and O'Keefe (2004) concluded that California's EZ raised employment by 3 percent over 6 years. Rubin's (1990) analysis, the most prominent work supporting EZs, found that 30 percent of the 500 companies she surveyed said the New Jersey EZ had affected company location and expansion decisions.

[2] Early studies of OZ outcomes nationally include Atkins et al. (2021); Chen, Glaeser, and Wessel (2019); and Theodos et al. (2020).

Fewer studies have examined the federal Empowerment Zones program. The Government Accountability Office (GAO) conducted two studies in 2006 and 2010 but failed to reach a conclusion due to poor data collection. Oakley and Tsao (2006) found limited evidence of improvements in certain Empowerment Zones compared to counterfactual sites—for example, poverty reduction in Detroit—but overall, they determined that the zones had little impact. Busso, Gregory, and Kline (2013) found greater impacts. According to their study, neighborhoods receiving Empowerment Zone designation experienced a 12–21 percent increase in total employment and an 8–13 percent increase in weekly wages compared to matched zones, and these gains came with only modest deadweight losses. They found, however, that the program had a nominal effect on rents and vacancy rates. Krupka and Noonan (2009) found that the federal program had a statistically significant and substantially positive effect on housing prices but varying and less impact on indicators of neighborhood quality.

These studies represent a mixture of shift-share and regression analysis, including sophisticated quasi-experimental designs. All recommend early and periodic performance assessments and monitoring of zones to help improve understanding of outcomes. We take this recommendation by reporting our early assessment of OZ policy in West Baltimore. Our qualitative approach sets the context for applying OZs to distressed neighborhoods and provides nuance on how and why the policy is and isn't changing development outcomes.[3]

Methodology

Our case study area is the West Baltimore Opportunity Zones Cluster (WBOZC) which we provide descriptive statistics for in exhibit 1. We selected the WBOZC for four reasons. First, the WBOZC represents 15 highly distressed census tracts representing roughly 44,000 residents that serve as a "black swan" for analysis; if findings indicate OZ policy attracted substantial capital, this may indicate that OZ neighborhoods with less distress could also attract equity. On the other hand, if we find negligible effects, we can explore why OZs are not serving neighborhoods most in need of investment. Second, Michael Snidal has a deep network and detailed knowledge of economic and community development experts and projects in West Baltimore. Third, both the City of Baltimore and the State of Maryland, unlike most jurisdictions, established staff positions to work specifically on OZs. These staff members could help identify capital flows and economic development activity in lieu of federal reporting mandates. Finally, Baltimore's proximity to Washington, D.C., allowed the first author to meet with economic development experts knowledgeable about Baltimore and national OZ activity.

[3] A comprehensive analysis of all peer-reviewed studies of state enterprise zones and the federal Empowerment Zone program is available from the first author upon request.

Exhibit 1

West Baltimore OZs Cluster Descriptive Statistics

Geography (# of census tracts)	Med Income ($)	Med House Price ($)	Med Rent ($)	Poverty Rate (%)	Unemployed (%)	College Educated or Greater (%)	Average Investment Score (1–10)*
West Baltimore OZs Cluster (15)	24,549	87,000	955	38	18	12	3.2
Baltimore OZs Cluster (42)	32,785	110,200	943	33	16	17	4.4
Baltimore (183)	42,094	134,800	961	24	13	25	4.2
Maryland OZs Cluster(149)	46,856	173,400	1,063	21	10	24	5.4
Maryland (743)	74,551	290,400	1,156	10	7	37	5.5
USA OZs Cluster (8,763)	33,345	108,000	725	31	12	18	5.3
USA (67,148)	53,657	178,600	953	15	5.8	29	5.5

OZs = Opportunity Zones.

**The Investment Score is the average score assigned to each census tract by the Urban Institute (UI) to capture lending activity before the introduction of OZs. UI established this investment score by census tract, ranging from 1–10, through a composite index which incorporates commercial lending, multifamily lending, single family lending, and small business lending data from American Community Survey (ACS), CoreLogic, Home Mortgage Disclosure Act, and Community Reinvestment Act data. Their full methodology can be found online: https://www.urban.org/policy-centers/metropolitan-housing-and-communities-policy-center/projects/opportunity-zones-maximizing-return-public-investment.*

Note: The West Baltimore OZs Cluster contains approximately 44,000 residents, and the City of Baltimore OZs contain approximately 120,000 residents, roughly 7 percent and 19 percent of Baltimore's population, respectively.

Source: Housing, poverty, employment, and education statistics are derived from ACS 2011–15 data

At the inception of the research, the first author developed an original 35-person participant list based on his knowledge and network of economic development experts. He then held initial meetings with the city council members representing the WBOZC and the City of Baltimore's designated OZ coordinator. Both authors also systematically reviewed OZ documents including enabling legislation, congressional testimony, articles and press releases by government, think tanks, advocacy groups, and local and national media. We emphasized actors and institutions engaged in business or project development in and around the WBOZC. Interviewees included developers, project sponsors, fund managers, wealth managers, investors, philanthropies, nonprofit agencies, community development institutions, city and state-level officials, and businesses. The interview list was expanded to 76 people using a snowball sampling method, a non-probability method of convenience in which the interviewing author asked each interviewee for recommendations for, and connections to, other experts at the end of each interview. A typology of the study participants is provided in exhibit 2.

Exhibit 2

Participant Typology for West Baltimore OZs Evaluation

Participant Identification	Number of Interviews
Government Agency	7
Elected Official	6
Banking/Fund Manager/Business	18
Developer/Small Developer	16
Nonprofit/Community Developer	15
Think Tank/Consultant/Philanthropic	14
TOTAL	76

OZs = Opportunity Zones.
Source: Michael Snidal

Interviews were open-ended and semi-structured. The first author explained the purpose of the study and described the participant identification process at the opening of each meeting. He asked selected questions from a list created by the authors. Not all interviewees were asked all questions because questions were tailored in advance of each interview. Frequently, interviews moved away from a question-by-question format and into dialogue and conversation across questions or topics. The first author was intentional, however, in balancing depth spent on each question with breadth of questions during each interview. Interviews were not recorded, but the first author took extensive notes during and after each interview, including capturing direct quotes.

Interviews started in October 2019 and ended in December 2020. Most interviews were conducted in person through February 2020 at offices, restaurants, coffee shops, and other locations across Baltimore, New York City, and Washington, D.C. In response to the advent of the COVID-19 pandemic in March 2020, we paused the study from mid-March to August 2020. We then conducted interviews in an online format. To clarify unclear responses, we followed up with 29 participants by email, phone call, or meeting.[4] We also requested OZ documentation from some participants, such as project-level financial projections, if the documentation would assist our analysis.

Project development details and investment estimates come from participant interviews, media reporting, and the first author's knowledge of Baltimore development. In cases where we do not footnote public reporting, development information and project finance estimates come exclusively from participant interviews and not objective records. Each financing estimate was checked for accuracy with at least three participant sources. Despite our best efforts, we cannot guarantee the accuracy of these numbers or whether we captured all OZ activity. We likely missed investors, developers, and businesses who considered, but ultimately abandoned, OZ capital.

Results: OZ Investments

Three years after the Tax Cuts and Jobs Act of 2017 (TCJA) was signed into law, no OZ capital had been committed in the WBOZC. However, we documented six OZ investments across the City of Baltimore. We also documented three projects, two within the WBOZC, that are likely to secure OZ financing within the next year. Excluding a $154 million OZ investment made in a $5.5 billion mega-development project at Port Covington, these projects represent $78 million of OZ equity, supporting roughly $468 million in real estate and business development projects across the City of Baltimore.[5] Baltimore OZ investments are documented in exhibit 3.

[4] The first author met with nine participants more than once. This includes multiple meetings with the City of Baltimore's OZ Coordinator.

[5] In Maryland, the comparable numbers are roughly $192 million and $800 million, respectively. Novogradac, a national professional services organization that is tracking Qualified Opportunity Fund (QOF) development, estimates the comparable amount invested across the country (as of the third quarter of 2020) at roughly $12 billion. See Novogradac OZ fund list. The White House Council of Economic Advisors (CEA) contends that this has spurred roughly $75 billion in total development over the same period. However, CEA's estimate includes investments that would have taken place without OZs. See CEA (2020).

Exhibit 3

Baltimore OZ Investments

Project/ Business	Description	OZ Investment ($)	Total Investment ($)	Med Income ($)	Med House Price ($)	Med Rent ($)	Poverty Rate (%)	Unemployed (%)	College Educated or Greater (%)	Investment Score (1–10)*
Yards 56	Mixed use development	30 million	150 million	50,280	124,500	1,061	11	7	17	5
Prosper on Fayette	Workforce housing and hotel	15 million	55 million	55,277	254,000	1,445	27	4	79	9
Galen Robotics	Business expansion	1 million	7 million	46,250	167,500	1,341	27	15	42	7
Penn Station	Amtrak Station redevelopment	10 million	90 million	36,607	219,200	908	30	17	43	6
Outlook Studios	Business expansion	1 million	Unknown	28,109	182,600	906	49	20	12	2
Port Covington	Mixed use mega-development	154 million	5.5 billion	103,667	276,000	1,802	9	6	71	10
North Ave Commercial**	Affordable housing & local business	1.2 million	4.5 million	31,855	122,500	976	33	21	24	2
Madison Park North**	Mixed use development	10 million	100 million	39,470	252,600	959	35	16	34	1
Northwood Plaza**	Mixed use development	10 million	58 million	43,221	150,700	935	20	14	31	6

OZs = Opportunity Zones.

**See exhibit 1 for description and source of "Investment Score." This is the score of each census tract and not an average.*

***Project, in appendix B, is an expected not finalized OZ investment.*

Source: Housing, poverty, employment, and education statistics are derived from American Community Survey, 2011–15 data

Baltimore OZ investments are supporting economic development that benefits city residents at-large, including investments in transit-oriented development and a minority-owned business, the attraction of high-paying technology jobs, and the development of a grocery store and other retail amenities.[6]

Little OZ capital, however, is flowing into deeply distressed neighborhoods. Investments in distressed communities include an estimated $1 million investment for minority-owned business expansion, a $10 million investment in a $100 million mixed-use redevelopment project, and a $1.2 million investment in a $4.5 million affordable housing development. These projects meet the stated intention of OZ policy, but they represent less than 5 percent of total OZ equity deployed or expected to be deployed in Baltimore. In contrast, 65 percent of all OZ capital is flowing into Port Covington, a census tract with a household median income approaching $100 thousand and where a $5.5 billion project was already underway.

We find OZs provide a "gap" equity source that may speed up a project timeline or substitute for other capital sources, but that does not determine the fate of a project or stimulate entirely new development. Direct subsidy programs and federal New Markets Tax Credits (NMTC) are more critical sources of capital to spur development. We observed dedicated government staff, sophisticated developers, and a few mission-driven financiers working to leverage OZs for community development. They illustrate a locality doing its best with a federal tax preference that was poorly designed for distressed neighborhoods. Most importantly, we document how OZ policy is failing to support or incentivize community development entities, community developers, small businesses, nonprofits, and institutions already operating in and around distressed neighborhoods. This is the missed opportunity of OZs.

Results: OZ Strengths and Weaknesses

Based on investment and development activity in the WBOZC and Baltimore City at large, we draw the following conclusions about the strengths and weaknesses of OZs for distressed communities.

OZs are Stimulating a New Set of Investors and Development Conversations

The greatest benefit of OZs is their ability to stimulate new investment conversations and attract new investors. We documented over 50 funds that had connected with individual businesses and projects in Baltimore. OZ coordinators reported as many as 80 projects across the city that were potential candidates for OZ investment. Whereas most of these funds and projects had not deployed or received capital, we found consensus that OZs had led to a new development "ecosystem" with the potential to stimulate economic development. As the city's OZ coordinator summarized: "One of the most important outcomes has been OZ's ability to attract a diverse cadre of new investors to Baltimore city. …these relationships represent new doors for attracting capital and development to Baltimore city."[7] One developer confirmed: "Investors are looking at areas that were previously redlined to development because of their race or ethnicity."[8]

[6] A detailed profile for each project in exhibit 3 can be obtained in a longer format report of these interviews. See Snidal and Newman (2021).

[7] OZ coordinator interviews.

[8] Government agency interviews.

Over the study period, investors and developers toured Baltimore, met with elected officials, attended conferences, and inquired with city and state OZ coordinators and project sponsors. OZ events were local and national in scope. For example, in January 2019, the Jack Kemp Foundation hosted over 200 people in Baltimore to discuss OZ opportunities and challenges. In October 2019, several project sponsors offered tours of OZ sites as part of an annual Baltimore "homecoming" event where successful professionals with links to Baltimore were invited back to the city to discuss how they could invest in its future. In October 2020, the online database "OpportunityDb" hosted a three-part webinar with several Baltimore OZ project sponsors as discussants.[9] Project sponsors also created marketing material for OZ investors. For example, a mid-sized development firm working in the WBOZC presented the first author with a sophisticated offering sheet of the sale of a multimillion-dollar OZ incentivized real estate portfolio. However, participants described this new investor class as primarily interested in market-rate development opportunities. They did not expect this new ecosystem to make large investments in Baltimore's lower-income and African-American neighborhoods like West Baltimore. A housing developer in WBOZC noted, "Sure, there may be new groups of investors that drive through [these neighborhoods] as part of an OZ marketing event. But when push comes to shove, [OZs don't] change their bottom line…they are only going to consider the same five or six neighborhoods that outside investors have always looked at."[10] Likewise, the president of a major regional community development organization noted that "the moment one of these investors sees the [3–5 percent] returns we are offering, the OZ conversation halts…."[11] Three community developers indicated that these conversations were short-lived and created a false sense of hope. The head of a development nonprofit noted, "[We] approach OZ investor connections with caution" because they have "eaten up a lot of [our] time" but failed to materialize.[12]

Small developers working in West Baltimore were generally skeptical of any new ecosystem. A housing rehabilitation firm in the WBOZC suggested that this new ecosystem "works within the existing power structure of development. Our bottom-line concerns social outcomes; outside OZ investors are looking for large financial returns. So, the conversation start[s] and end[s] there."[13] Community Development Entities (CDEs) indicated that the work they were already doing in distressed communities, particularly around affordable housing, was fragmented from this new network. They noted that OZs were not compatible with Low Income Housing Tax Credits (LIHTC) and other debt-led development.[14] We also found that the philanthropic sector was largely uninvolved with OZ policy except for the Abell Foundation funding the City of Baltimore's OZ coordinator position. We discuss OZ's failure to incentivize capital already operating in undercapitalized markets in more detail in the following section.

[9] For webinar see Milbergs (2020).

[10] Developer interviews.

[11] Nonprofit/community developer interviews.

[12] Nonprofit/community developer interviews.

[13] Developer interviews.

[14] Study participants stressed two reasons for this: (1) LIHTC projects are typically debt financed while OZs are an equity incentive and (2) OZs are a 10-year exit (that is, the major benefit accrues at year 10) while LIHTC is a 15-year exit which makes it challenging to time OZ-LIHTC projects.

OZs Are Spurring New Local Government Development Capacity

Related to this new ecosystem, OZs have created a new organizing structure in which the city engages in development. This is primarily the result of city and state OZ coordinators tasked to work with existing local officials to promote development in these zones, connect investors to OZ projects, track OZ activity, and present on OZ opportunities and progress. It is critical to note that these positions were not mandated by the federal government. On the contrary, OZ legislation mandated no requirement or appropriations for local economic development planning. Consequently, this outcome is best understood as an indirect result of Baltimore and Maryland deliberately establishing new positions.

The Baltimore OZ coordinator describes himself as a "matchmaker." This matchmaking, and the database of projects that has flowed from it, is stimulating new and more coordinated conversations within local government about setting priorities, allocating limited local dollars, and identifying resources for projects. OZs, in tandem with a new neighborhood impact investment fund (NIIF), have stimulated "a set of monthly meetings where many of the city's major agency leaders…come together and…go through projects one by one in a way that wasn't as intentional before the incentive." According to leadership at the City of Baltimore's Department of Housing and Community Development (DHCD), "the city now has a point person to connect the dots on investment and development." Another DHCD staff member noted that "the rollout of OZs fit very nicely in the early adaptation of Baltimore's community development strategy."[15]

Increased local government capacity includes the creation of a "development prospectus," a marketing document that the OZ coordinator pitched to developers and investors to tout the city's opportunities, projects, and neighborhoods.[16] It includes an interactive website portal where OZ actors can locate projects, information, and contacts about the state's OZ activity.[17] It also encompasses state legislation that extended existing employment incentives to all businesses that locate or expand within Maryland's OZ footprint.[18] Developer and investor participants frequently mentioned these developments and this new capacity. One developer noted, "the great thing about [OZs] is now we have this reliable point of contact in the city to get this project to completion …." Another development executive said, "Before [OZs], we frequently held off on consulting with the city until we had our sources and uses better lined up. After [OZs], we may be inclined to check in with the city on other opportunities…."[19]

It is noteworthy that eight study participants suggested that OZs may be redirecting government capacity away from non-OZ opportunities and privileging an elite set of investors with access to capital gains dollars. At the same time, city government participants noted that a major challenge of OZs was dealing with inquiries from people without any development experience or plan, or who were not serious investors. A major developer noted, "OZ hype [comes with] a challenge.

[15] Government agency interviews.

[16] See Baltimore Development Corporation (2018).

[17] See Maryland Department of Housing and Community Development (2018).

[18] See Opportunity Zones Incentives, S.B. 581, Regular Session 2019. (2019).

[19] Developer interviews.

Now you also have a bunch of inexperienced people talking about projects without a lick of development expertise…."[20]

Five participants expressed cynicism of OZ policy altogether, describing it as a "distraction," "total waste of time," and even a "con." An executive of a regional community development nonprofit stated, "[OZs are not] the only economic development strategy that needs capacity.… We have other zones and programs… this energy would be better served developing a strategy to win NMTC through a captive CDE."[21] Similarly, two of these participants proposed that OZ efforts be redirected toward developing municipal banking because commercial banks lend a trivial amount of their overall loan percentages to African-American residents and in African-American neighborhoods.[22] A policy expert described OZs as "the latest in a series of steps to redirect local development capacity to outside and powerful holders of capital."[23] Likewise, a program manager at a housing nonprofit commented, "Once again, the government is telling us that the solution to the problem is to compete for the same capital that ignored us in the first place." Thirteen total participants expressed a general concern that OZ's primary purpose is tax relief for the wealthy. The director of a nonprofit described [OZs] as "…[a] new way to reduce taxes for a bunch of people who…already aren't paying their fair share."[24] Even so, most of these participants supported OZ policy with a "nothing to lose" explanation.

OZs Are Failing at Oversight, Community Engagement, and Education

Baltimore and the State of Maryland made good faith efforts to track OZ development. The city held multiple meetings and workshops with neighborhood leaders and community organizations. The OZ coordinator noted that the city was "very intentional with investors…about investing in distressed neighborhoods."[25] City officials selected low-income neighborhoods for OZs, and they were deliberate about trying to establish community benefits agreements and employment targets around the policy. They also guided investors to high-priority projects that would be beneficial for Baltimore's lower-income and minority communities.

Even so, OZs are opaque and undemocratic. It offers no planning mechanisms for communities to prevent harmful investment. Participants repeatedly noted that OZs provided no designated funding to introduce communities to the tax preference or to educate them on how they could identify and connect with investors. Commitments like these, which help build trust with communities, are necessary to stimulate positive development in distressed communities, especially those with long histories of race-based disinvestment and skepticism of outside investors.[26]

The city coordinator referred to OZs as a "marketplace" and not a "program." He acknowledged that "at the end of the day, these are private-sector investors, and we don't control their purse

[20] Developer interviews.

[21] Nonprofit/community developer interviews.

[22] See Vanatta (2019) for the Abell Foundation report on this topic which two study participants referred us to.

[23] Think tank/consultant/philanthropic interviews.

[24] Nonprofit/community developer interviews.

[25] Government agency interviews.

[26] Participant interviews.

strings."[27] A manager of an investment fund described local ability to steer OZ investment as "like being placed in a sea with a paddle. The federal tax code is a pretty blunt mechanism to just throw at localities for economic development," this participant added.[28] The four Baltimore city councilmembers, as well as the two state legislators interviewed for this study, stressed their frustration with the lack of policy oversight. The latter added that a critical motivator for Maryland's OZ enhancement legislation was to try to establish a mechanism for project oversight.[29]

Participants were conflicted about how much oversight was needed. Some developers, including those involved in OZ deals, admitted they did not know how the OZ certification process worked. Even the most "laissez-faire" participants believed the existing tracking mechanism, self-certification by Form 8996, was insufficient and undermining trust.

A developer with a history of working in West Baltimore noted, "In my experience, too much community oversight of private development can lead to misinformed actors that end up scuttling good development… but we have clearly moved too far to the [opposite] end here. [OZs] could… at least have some sort of interim reporting so residents know what the hell is going on and so developers have some guardrails."[30] Likewise, a fund manager commented, "[OZs have] laid bare just how far we have moved away from transparency in economic development …parasitic development is happening, and the feds should not be incentivizing that."[31] A CDE executive went so far as to describe the reporting requirements as "comically corrupt."[32]

Community Development Corporations (CDCs) and smaller developers were the most concerned with the program's lack of oversight, education, and engagement. A CEO of a CDC stated, "[the Empowerment Zones program] may not have succeeded, but at least the community knew how [it] worked. …why isn't there a grant program to educate the residents on how [OZs] work?"[33] The developer of a project in the WBOZC, which expects OZ financing, noted, "the potential for unintended consequences is massive. One, all the development may just be concentrated on areas that don't need it. [Or] two, it isn't… but [OZs lead] to development that causes displacement."[34] These participants and two others suggested that educational engagement around OZs would help counteract a general skepticism of community development initiatives in poor minority communities. They also suggested that it might encourage smaller developers to engage with the policy and seek out OZ investment opportunities and conversations.

Consistent with these views was the incomplete understanding of how OZs work by most community developers and elected officials who participated in our study. We did not find this to be the product of the city and state poorly communicating their OZ efforts. Rather, OZs are such a sufficiently complicated economic development tool that they require federal funding for education

[27] Government agency interviews.

[28] Banking/fund manager/business interviews.

[29] Elected official interviews.

[30] Developer interviews.

[31] Banking/fund manager/business interviews.

[32] Nonprofit/community developer interviews.

[33] Nonprofit/community developer interviews.

[34] Developer interviews.

and engagement. Even the office of a U.S. Senator from Maryland showed a tenuous grasp of how OZ policy worked.

OZs Are Not Changing Economic Development Outcomes in Distressed Neighborhoods

OZs are stimulating new conversations and interest about investment in Baltimore, but this interest has not materialized into new developments for distressed neighborhoods. We documented two projects in the WBOZC likely to receive OZ financing: a $10 million investment in a $100 million mixed-use redevelopment project, and a $1.2 million investment in a $4.5 million project focused on minority-owned business development, zero energy waste, and affordable housing. Study participants described these projects as excellent examples of community-oriented development in and around West Baltimore. While OZs offer each project an additional source of capital for development and may accelerate developer timelines to secure project financing, neither project depends on this financing. Several aspects of OZs explain their inability to attract economic development to truly distressed neighborhoods like West Baltimore.

OZ Investors Demand Market-Rate Returns

OZ investment funds typically seek double-digit internal rates of return (IRR) between 10 and 16 percent, whereas projects in Baltimore's distressed tracts are more likely to generate IRRs no higher than 3–6 percent while also being considered higher risk investments. Most OZ funds are seeking market-rate returns on the same types of investments that other funds are making, regardless of the OZ incentive. An established national developer reported that he was "disappointed at the number of national OZ funds that are expecting pre-tax, compounded IRRs of high teens or even 20 percent for a 10-year hold on 'easy stuff.'"[35] The lowest IRR sought by an OZ fund that we found, which was not based upon an existing relationship for a specific project, was about 8 percent.

Mission-driven funds willing to accept lower returns have either been unable to raise OZ equity or unable to deploy it in truly distressed census tracts. This is partially because low-income census tracts are not expected to appreciate and partially due to technical design flaws, which we discuss later in this section. According to a director at an impact investment firm who considered a fund to support projects in the WBOZC: "there are a lot of reasons, from market realities to specific technical issues, that [OZs are] not going to work for us. [We are] not unique… 95 percent of mission funds have not raised equity."[36] A manager at a development firm exploring locations for an OZ business in Baltimore said, "[OZs don't] offer the value proposition" to invest in distressed neighborhoods.[37] A project sponsor unable to secure OZ capital stated, "[OZs are] meant for market-rate investments, some as high as 18 percent. And this does not fit the race and income profile of [distressed] neighborhoods in Baltimore or elsewhere …. [Do not] expect these funds to [invest] in low-income Black and Brown neighborhoods."[38]

[35] Developer interviews.

[36] Banking/fund manager/business interviews.

[37] Developer interviews.

[38] Nonprofit/community developer interviews.

OZs Are a Weak Incentive That Does Not Spur "but for" Development

OZs are a weak incentive that does not change development outcomes on its own. The tax deferment and the year-5 and year-7 step-up basis benefits of OZs offered little value to investors. One developer described these as "worthless." Another noted, "we basically don't bother trying to model those into our proformas anymore." Five participants suggested that these be substantially increased to have effects. Investors find the value of the tax preference to be the permanent exclusion of taxable income on new gains for investments held for 10 years or longer.[39]

Based on a review of four OZ development proformas and participant reporting, we estimate the overall value of the tax preference to be worth 150 to 400 basis points (1.5–4 percentage points on an IRR). Participants described this value as relatively meager. A developer in the WBOZC noted, "game-changing tax policy would need to incentivize way deeper than this." Another development team sent us a proposal to layer OZs with a host of other incentives and strategic planning. The proposal reads: "Attracting OZ equity investment for important but challenging projects in highly distressed OZ neighborhoods is proving to be especially difficult." A Baltimore developer with a long track record of community-oriented development responded by email: "…we quickly determined to stick with [NMTC] investments and avoid the headache." A developer working in the WBOZC commented, "I think the development community sees [NMTC] as a [much] more effective program." Consistent with this sentiment, the developer of an OZ project commented that "OZ…was not the 'but for;' if anything [NMTC] were the 'but for.'"[40] A community banking expert added, "OZ doesn't stop the car from running out of gas…."[41] Participants described OZs as being for "investment-grade" and "shovel-ready" projects. In addition to NMTC, they noted that state and federal subsidy programs, like Economic Development Administration grants, are more important to supporting development than OZs.[42]

OZs Fail to Incentivize Community Developers and Investors

Developers and institutions investing or interested in investing in West Baltimore do not have readily available access to capital gains dollars. A recurrent theme in participant interviews was that there was no shortage of capital in Baltimore and particularly the greater Baltimore-Washington region that could be incentivized to invest in West Baltimore and other distressed areas. OZ's favoring of capital gains over alternate capital sources, however, means it fails to attract these actors. As one real estate developer put it bluntly, "private equity guys with marble floors from New York are not going to come down to do a deal in the 'hood' in West Baltimore, regardless of the incentive you offer them. But there is private wealth here, and there are plenty of people who say '[expletive], my grandparents are from Baltimore. I want to make an investment here.'" Another developer similarly stated, "There won't be bigger community transformation without incentivizing … people involved in the development process."[43]

[39] Participant interviews.

[40] Developer interviews.

[41] Banking/fund manager/business interviews.

[42] Participant interviews.

[43] Developer interviews.

We found eight examples of OZs failing to support existing development and developers in the WBOZC. These include an expert in African-American wealth-building who is redeveloping single-family housing, a nonprofit providing construction contracts and homeownership opportunities for women of color, and a warehouse in an old lumber yard that could be used for adaptive re-use. We also documented four small businesses that had considered OZ financing to locate in a distressed community but that had been unable to find a deal with OZ investors.

OZs also fail to incentivize institutional capital. Pension funds and endowments came up in over 10 interviews as under-tapped sources of private capital to invest in distressed neighborhoods. According to the CEO of a nonprofit, "[OZs are] focused on attracting Silicon Valley dollars, which is all fine and good. But what the local economic development community has been realizing…a lot of money [is] sitting smack here in the Baltimore region that need not go to Boston or leave the country altogether." Another nonprofit executive noted, "given all the thought cities have put into anchor institutions and homegrown investment, I was disappointed to learn [OZs are] still working under the failed idea of chasing corporations…."[44] Three participants mentioned HopkinsLocal, a 2015 Johns Hopkins University endowment-funded initiative focused on local hiring and minority-owned business development, as an example of an existing initiative that OZs should be incentivizing (Johns Hopkins University, 2015).

Participants also frequently mentioned the absence of Community Development Financial Institutions (CDFIs) and CDCs as actors that were "critical to development in distressed communities" but "left on the sidelines," as one CDFI executive described.[45] CDFIs typically engage in debt-driven development, whereas OZs incentivize equity. An OZ fund can be set up as a separate private investment to support nonprofit development. However, as OZ investors seek high double-digit IRRs, they are often not suited to investing in these lower IRR projects. CDFIs also do not have the resources or human capacity to set up new private OZ funds. Moreover, federal rules about timing requirements for the deployment of capital make it difficult and risky for mission-driven organizations to execute OZ deals.[46] Likewise, CDCs tend to have long planning and development periods, including using the 15-year duration LIHTC.

A few national nonprofits, including Enterprise Community Partners, reported successfully incorporating OZ capital in projects outside of Baltimore. Executives, however, described these models as "not replicable to scale."[47] Baltimore's one exclusive CDFI,[48] and the seven other CDFIs active in Baltimore, were not directly involved in any OZ projects. Six participants mentioned that OZs did not properly align OZs with existing affordable housing and public housing redevelopment efforts. Two national affordable housing experts said that OZs were providing a new source of capital for workforce housing but that it did not support the development or preservation

[44] Nonprofit/community developer interviews.

[45] Nonprofit/community developer interviews.

[46] See more on technical design challenges in next section.

[47] Nonprofit/community developer interviews.

[48] Baltimore's Neighborhood Impact Investment Fund (NIIF) was applying for CDFI status and may become a second Baltimore CDFI.

of deeply affordable housing.[49] As one of these experts summarized, "the [affordable housing] industry does not see OZ as a game changer, [only] as a bridge source for development."[50] We found public housing authorities (PHAs) largely unfamiliar with OZs altogether.[51] The Housing Authority of Baltimore City confirmed this observation: "OZ just doesn't work for deeply affordable housing… or schools or infrastructure—the needs which we are involved in." A city official reiterated, "housing authorities are being expected to engage with OZs, but OZs didn't engage with housing authorities. Frankly, [PHAs] left out is a shame because [they] are… deeply knowledgeable in the challenges facing distressed neighborhoods."[52]

OZs Were Poorly Designed to Benefit Distressed Neighborhoods

OZs suffer from design flaws that make investment in distressed neighborhoods unlikely. Although the City of Baltimore selected distressed neighborhoods in need of investment, federal selection criteria force distressed communities to compete for investment with non-distressed communities both locally and nationally. Nationally, OZ selections have been shown to be of higher or equivalent levels of distress when compared to areas eligible for OZ investment that were not selected. Gentrified neighborhoods, however, or neighborhoods already experiencing capital investment, were also selected (Gelfond and Looney, 2018; Theodos, Meixell, and Hedman, 2018). Across the United States, 56 percent of census tracts qualified for OZ designation. In Baltimore, the rate is 92 percent (Din, 2018). Selection criteria allowed some non-low-income tracts contiguous to low-income tracts to qualify. Some OZ selections were made using outdated data and where distress was not defined properly.[53] For example, numerous college campuses, including the University of Maryland, were eligible for selection because students are considered low-income (Gelfond and Looney, 2018). This limits the likelihood that capital will flow to distressed neighborhoods.[54]

Baltimore selected 41 census tracts based on a set of overlapping investment strategies.[55] OZ selection was also aligned with a NIIF and with a new community development framework (Baltimore City Department of Housing and Community Development, 2021; NIIF, 2020). The Governor of Maryland approved 38 of the 41 tracts proposed by the City of Baltimore and added four new census tracts. The resulting 42 tracts were approved by the U.S. Department of the Treasury. It is noteworthy that two of the four tracts added by the Governor were downtown and Port Covington and that the

[49] The first author has compiled a detailed list of findings on how OZs are and are not being used for affordable housing. These are available upon request.

[50] Nonprofit/community developer interviews.

[51] The first author presented this study to the Council of Large Public Housing Authorities at their annual meeting in October of 2019. PHAs were largely unfamiliar with how the tax preference worked.

[52] Government agency interviews.

[53] Opportunity Zones were selected using data from the American Community Survey from 2011–15. States had the option to use 2012–16 data, but this was not required even if the neighborhood conditions had changed. See Gelfond and Looney (2018) for more on this flexible selection criteria.

[54] Conceptually, it is easy to understand why poor federal criteria for targeting and defining distress leads to distressed areas receiving little investment. OZs put localities in competition with each other for a new class of investors with most of the direct costs of the incentive—capital gains tax collections—the federal government's responsibility. To compete with other states, governors are incentivized to propose higher income or gentrifying census tracts. These tracts offer greater levels of price appreciation and thus receive most OZ investments.

[55] For a review of these strategies see Seigel and Estores (2018).

latter was only deemed eligible because of a mapping error.[56] Downtown's area median income (AMI) was greater than any census tract that city officials had recommended. Port Covington's AMI was twice as large as any census tract city officials had recommended.[57]

Participants described Port Covington as a logical and smart choice for the Governor to compete for OZ investments. They expressed concern, however, regarding its inclusion. A developer active in the WBOZC noted, "now we have a situation where new investors…come in town and do their homework but end up focusing on [Port Covington… not…] places that actually need this outside [capital]."[58] Similarly, a banker described Port Covington as "a totally different beast than the other OZs."[59] They felt that the inclusion of downtown and Port Covington made it difficult for distressed neighborhoods to compete successfully for OZ capital.

Participants knowledgeable in national OZ activity described this as a federal design failure. One fund manager commented that this "is not a story about Port Covington" but rather a challenge with OZ's broad selection criteria. He added, "Unfortunately…a bunch of places that already weren't going to see development [have been] put on a stage against places with [existing] development [activity] and savvy developers. If the playing field is West Baltimore against gentrifying Brooklyn or [downtown] Portland, West Baltimore isn't happening."[60] An economic development expert confided, "I think it is totally possible we see 75 percent of [total] investment being made in just a few [non-distressed] neighborhoods." These participants suggested that OZs required a more accurate definition of distress, the removal of contiguous tracts, and/or a deeper incentive for truly distressed areas. A nonprofit focused on development in underinvested communities described OZ selection criteria as the "original sin" of the policy.[61]

It is noteworthy that most real estate developer participants believed there was also logic in adding less distressed tracts to qualify for OZs as a strategy to help spur investment in more distressed tracts. These real estate developers described Baltimore as requiring a "domino effect," "edge" neighborhood-led development, and/or "working from your strengths" strategy.[62] These developers believed that projects like the redevelopment of Amtrak's Penn Station and Northwood Commons, which are not located in deeply distressed tracts but still qualify as distressed under OZ's definition, may catalyze development in adjacent tracts that are deeply distressed. They did not believe, however, that Port Covington or other "contiguous" tracts served this purpose or meant the intention of the policy.

[56] Port Covington qualified as "contiguous" due to a computer program glitch. See Ernsthausen and Elliott (2019).

[57] Based on 2011–15 ACS data, Downtown and Port Covington had AMIs of $55,277 and $103,667, respectively. The census tract with the highest AMI recommended for OZ designation by city officials was $50,280.

[58] Developer interviews.

[59] Banking/fund manager/business interviews.

[60] Banking/fund manager/business interviews.

[61] Nonprofit/community developer interviews.

[62] Developer interviews. Note: "working from your strengths" was the development slogan and strategy of Baltimore Mayor Martin O'Malley. Baltimore City continues to maintain a strategic focus on "middle market" neighborhoods. See City of Baltimore Department of Planning (2020).

OZ's short selection period also did not allow time for planning processes to stimulate market-rate development.[63] This hindered investment in truly distressed neighborhoods. Baltimore's distressed neighborhoods require "development gestation periods" and "market making" in advance of a market-based incentive. These are processes in which public, philanthropic, and nonprofit actors strategically align resources, ideas, and proposals to assist neighborhoods to engage with the market. As one city agency executive summarized, "…distressed neighborhoods could be poised for development… [with]… long-term planning for future investment. But the… short [OZ selection] timeline didn't give the city the ability to be strategic like that." An executive at Baltimore's Department of Housing and Community Development (DHCD) indicated, "There is a lot of 'tilling of the soil' that needs to be done in some … neighborhoods…. [But] the quick designation means [we have to] focus on the short-term deals that you already knew were going to happen."[64] Investors and businesses also indicated that the fast, unorganized rollout of OZs, including Treasury Department guidelines, which were disseminated on a piecemeal basis, discouraged transformative and higher-risk investments.

If the federal government had better aligned OZ policy with direct investment programs, particularly targeting infrastructure and housing, and had they given localities more time to prepare and align their local tools and resources, additional development and investment might have been stimulated. As a developer contemplating an OZ deal stated, "If you really want to see a whole neighborhood improve, you need some sort of planning process…to connect this to the city's strategy around anchor institutions and innovation processes, [etc.]."[65] Five participants suggested that the federal government proactively align OZ policy with direct subsidies from federal agencies, including the Department of Housing and Urban Development (HUD), the Economic Development Administration (EDA), and the Department of Transportation (DOT).[66] A city councilmember representing the WBOZC described the OZ rollout as "putting the cart before the horse," suggesting federal agencies should have provided direct dollars for predevelopment in advance of [OZs]."[67]

OZ rules also make investment in distressed neighborhoods unlikely. Capital deployment regulations stipulate that investors deposit their capital into a fund within 6 months of the gain being realized. In turn, funds must invest their capital in an OZ property or business within 6 months. Meant to ensure that tax-deferred capital is invested into OZs, this process creates risks that are particularly challenging for mission-driven investors with low margins for error. A director at an impact investing firm summarized, "The overarching problem is technical… holding, calling, and deploying OZ capital flies in the face of how private equity often works." Another fund manager said, "You must be simultaneously raising and investing capital…. This is a real challenge and may be why many funds don't materialize and many businesses aren't funded." A third

[63] States had only 90 days to submit their selections to the Treasury although they could ask for a 30-day extension.

[64] Government agency interviews.

[65] Developer interviews.

[66] One year after the Tax Cuts and Jobs Act of 2017 (TCJA) was signed into law, The White House established the Opportunity and Revitalization Council to identify existing federal programs that could be targeted, prioritized, and enhanced in OZs and other distressed communities. See White House (2019). While this effort may reflect the spirit of Comprehensive Community Initiatives, study participants were either unaware of it and/or described it as reactive.

[67] Elected official interviews.

investment fund participant indicated that these deployment rules restricted OZ venture capital from investing in new startups like traditional venture capital. A mission-driven fund manager confirmed, "the challenge is timing, timing, timing. Developers are looking at options on property, [but OZs don't] give them enough time to do their due diligence."[68] A developer of a Baltimore OZ project said, "because you have to get money out the door quickly, time pressure may lead to missed opportunities but also dumb inexperienced investments."[69]

We documented design flaws beyond capital deployment rules. The CEO of a software startup company that sought but did not secure OZ financing responded by email, "the biggest issue was just uncertainty on how a software business could qualify without intangible assets… It was deemed to be too risky for the investors [given] the potential retroactive penalties and interest on taxes." An established company that also considered OZ investment said that OZ policy designers "didn't understand what 'substantial improvement' meant for a small business. Maybe they will figure it out… but we have moved on…. They should have consulted with fund managers about … business development before [putting this into] the tax code."[70] A consistent theme emerged from interviews with businesses: OZ designers failed to fully engage with venture capitalists and fund managers in policy design.

Finally, OZs were failing to address a historically racialized hurdle to development in distressed neighborhoods, the "appraisal gap." In Baltimore, historic banking practices, such as redlining, drove down land values in targeted neighborhoods for decades. Part of the legacy is that current bank regulations now prevent investments in these neighborhoods because the as-is built value of many proposed projects remains low. For example, one study participant was an officer at a national bank that was deploying OZ equity for projects that met Community Reinvestment Act compliance standards. The bank accepted preferred returns as low as 3 percent, thereby facilitating true mission-based development. The bank was hoping to deploy over $100 million in OZ equity in 2021. It had explored four different OZ projects in distressed Baltimore neighborhoods over the course of our study. The bank ultimately was unable to close on a project, however. The officer explained: "in low-income neighborhoods, the appraisal gap [remains] a significant challenge in having a developer find true equity… because we have to [reduce] the [amount of] debt and equity [that we can commit to the project] based on the appraisal."[71] Similarly, in a conversation about appraisal gaps, a nonprofit developer stated, "An OZ type program could be valuable if we… figure out how to value low-income Black and Brown communities."[72]In brief, some OZ proposals do not obtain sufficient capital because the appraisal industry assesses properties in minority neighborhoods at values lower than those projected by investors and developers.

Eight participants discussed how neighborhood value is tied to race and how development standards and criteria, which OZs rely upon, help maintain and replicate a system that denies wealth building in African-American communities. In addition to appraisal gaps, these participants

[68] Banking/fund manager/business interviews.

[69] Developer interviews.

[70] Banking/fund manager/business interviews.

[71] Banking/fund manager/business interviews.

[72] Nonprofit/community developer interviews.

noted that OZs failed to address the lack of sophisticated developers and desirable retail anchors in historically disinvested neighborhoods. These participants recommended direct government intervention in the form of subsidies or by the Treasury acting as a guarantor in historically redlined OZ tracts. We advance this recommendation in the next section.

Restructuring OZs

OZs require substantial restructuring to stimulate investment in distressed neighborhoods. We propose seven changes. Recommendations 1–2 include actions that Congress could take immediately. Recommendations 3–7 are illustrative only. They require additional analysis and the convening of development, policy, and legal experts.

1. Institute a Reporting Requirement

OZs are failing at oversight.[73] A federal reporting requirement is needed to fully understand OZ successes and failures and to protect against fraud and abuse. The absence of reporting sends a message that OZs may be a handout to the wealthy and not designed for the benefit of distressed communities.

As of this writing, legislation requiring detailed reporting requirements is pending. For example, Senate Bill 1344 and House Bill 2593 would require the U.S. Department of the Treasury to collect data on the number of funds created, their holdings, and their asset class.[74] They would also require data collection for census tracts receiving Qualified Opportunity Fund (QOF) investments, including measures of poverty reduction, job creation, and new business starts. States and federal agencies would report these data to Congress 5 years after the bill's enactment and every year thereafter. Another proposal, Senate Bill 2787, The "Opportunity Zone Reporting and Reform Act," requires that QOFs report on a host of information, including the identities of all investors, partnerships, and corporations in which the fund holds interest. This bill also creates penalties for taxpayers that fail to comply with reporting requirements. Finally, the bill directs the Government Accountability Office (GAO) to report on the effectiveness of the OZ legislation at years 5 and 10 (Novogradac, 2020). Several policy research and advocacy organizations have also proposed reasonable reporting standards.[75]

The original legislative proposal for OZs included reporting requirements, but they did not survive passage of the Tax Cuts and Jobs Act of 2017. Past federal initiatives offer more robust data collection standards than OZs. Data collection should be implemented immediately.

2. Remove Non-Distressed Census Tracts from OZ Eligibility

Giving localities, which compete for footloose investment, the authority to pick neighborhoods that may not meet the intention of investing in distressed neighborhoods has led to census tracts being designated for OZs that do not represent the ostensible objective of the legislation.[76] The continued

[73] See Results: OZ Strengths and Weaknesses #3

[74] H.R. 2593, 116th Congress. (2019). https://www.novoco.com/sites/default/files/atoms/files/hr_2593.pdf

[75] For example, see Theodos (2019).

[76] See Results: OZ Strengths and Weaknesses #4d

inclusion of non-distressed census tracts that are contiguous to distressed tracts may crowd out other private investment, result in large equity investments going to a few neighborhoods that did not need investment, and reduce the chances that OZs reach low-income neighborhoods. Removing contiguous tracts will not remove an important "edge neighborhood" development process described in the OZ strengths and weaknesses section of this report. In Baltimore, edge neighborhoods qualified for OZs because they met the definition of low-income.

Census tracts that no longer qualify for low-income status based on up-to-date data and those that were never intended to be eligible for OZ investment, such as college campuses, should be removed. The "Opportunity Zone Reporting and Reform Act," mentioned in the previous recommendation, provides one model to remove these tracts and replace them with more distressed tracts.[77]

3. Deepen the Tax Preference for Neighborhoods in High Distress

OZs are a weak incentive.[78] Flat rate benefits for a large and diverse set of census tracts means that most equity flows into a few neighborhoods that don't need investment while almost no equity flows into neighborhoods that most need investment. The 10 and 15 percent step-up basis advantages of the tax preference are poorly conceived and of marginal value to investors. However, our interviews and analysis of developer financials indicate that increasing these percentages would stimulate additional OZ investment.[79] Deeper incentives should only be considered for deeply distressed neighborhoods and must be tied to project eligibility and reporting requirements.

4. Funding for Education, Engagement, and Technical Assistance

OZ development in Baltimore has been heavily dependent on local support and capacity, most notably the creation of development coordinators who connect a new class of investors to developers and businesses. These positions were supported by local government and philanthropies, not federal policy. Even with local support, community stakeholders and small developers expressed insufficient education and engagement at the neighborhood level.[80] This is especially concerning because many OZ-designated census tracts have histories of parasitic and discriminatory investment. Moreover, OZ dollars are primarily available to highly experienced and sophisticated developers and businesses with deep contacts in private finance that truly distressed neighborhoods lack. To address this deficiency, the federal government should provide grant support for education, engagement, and technical assistance on OZs.[81]

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[77] Gelfond and Looney (2018) also offer additional guidance.

[78] See Results: OZ Strengths and Weaknesses #4b

[79] Our analysis of developer financials suggests the step-up basis advantages would need to be increased to at least a 50 percent reduction on the original capital gains investment. However, analyzing the depth of the incentive required in different housing markets across the country is necessary before a precise change is advised.

[80] See Results: OZ Strengths and Weaknesses #3.

[81] Study participants indicated the minimum level of support should include allocations for states to develop OZ coordinator positions and development strategy documents. Based on a preliminary analysis, we think this support would cost less than $75 million over 5 years of the program. At a greater cost, Congress should also consider grant support for predevelopment loans, technical assistance for businesses, and business incubator and start up support.

5. Fund Infrastructure and Provide a Federal Guarantee for OZ Investments

The rollout of OZs was poorly aligned with direct federal investments.[82] Future OZ investment is more likely to be stimulated if the federal government aligns new direct investments with OZ policy in highly distressed neighborhoods, particularly investments in infrastructure, housing, and transportation. Public investments would increase opportunities for real estate appreciation and business growth.

A federal guarantee should be added to reduce the risk for developers to invest in deeply distressed neighborhoods.[83] Because many distressed neighborhoods were not designated for OZs, it is critical that this guarantee represent additional funding and not the reallocation of existing forms of government aid for community development. The justification for new appropriations could be based on cost savings created by removing contiguous tracts that are currently receiving unnecessary OZ subsidies (as discussed in recommendation 2).

6. Incentivize Community Development Financial Institutions (CDFIs)

OZs fail to incentivize community development.[84] CDFIs are trusted community partners that are willing to take on higher risks and lower returns than traditional private equity actors. They have a long history of investing in low-income communities. As debt-led actors, however, they were not incorporated into OZ policy, which incentivizes equity investments (Tansey and Swack, 2019). In Baltimore, CDFIs are only indirectly engaged in OZs.[85]

Most CDFIs don´t have the capital or capacity to develop QOFs. For CDFIs to make OZ investments, large grant capital would need to be made available to allow these institutions to develop the personnel and knowledge to make equity investments. There are also shorter-term approaches to incorporate CDFIs into OZ policy. First, new legislation could treat subordinated debt and royalty debt products, used by CDFI banks, as OZ investments. This would increase CDFI bank lending capacity in distressed neighborhoods. Another possibility is to allow or require QOFs to partner with CDFI loan funds, bringing OZs under CDFI purview and steering funds toward mission-driven projects. House Bill 7262 proposes to amend the Tax Code of 1986 to allow QOFs to invest in CDFIs and could result in greater CDFI involvement in OZs.[86]

[82] See Results: OZ Strengths and Weaknesses #4d.

[83] The exact guarantee and underwriting requirements would need to be determined by additional research and in consultation with finance experts. The amount of risk capital necessary to change project outcomes requires analysis across multiple states and housing markets. According to one estimate shared with us by a mission-driven investment firm, $95 million per state in guarantee capital, over a 5-year window (approximately $4.75 billion total) would generate significant activity in distressed OZ census tracts.

[84] See Results: OZ Strengths and Weaknesses #4c.

[85] For example, through the allocation of New Markets Tax Credits (NMTC) to projects that were also recipients of OZs.

[86] H.R. 7262, 116th Congress (2020). Community Development in Opportunity Zones Act of 2020. https://www.congress.gov/bill/116th-congress/house-bill/7262/all-info?r=1&s=1

7. Democratize OZs to Non-Capital Gains Dollars

In Baltimore, we identified capital that, if given tax preference, is more likely to be invested in distressed neighborhoods than capital gains dollars.[87] In addition to CDFIs, OZs are a missed opportunity to capitalize entrepreneurs, investors, and developers who are geographically and emotionally connected to wealth building in distressed neighborhoods. OZs also fail to engage institutional dollars like pension funds of universities that operate in and around distressed neighborhoods but often invest in primary or foreign capital markets.[88]

Capital gains investors already have diverse investment options, and they demand rates of return that are unlikely to be found in distressed markets. Moreover, few small businesses and developers have access to these investors. Thus, we recommend expanding OZs to incentivize certain non-capital gains equity investments made in deeply distressed census tracts. In brief, a permanent exclusion of taxable income produced through an investment could be applied to traditional equity investments for qualified project sponsors and projects. Alternatively, this incentive could be substituted for the current capital gains design. [89] If properly implemented, these changes could encourage development in distressed neighborhoods and prevent waste of future tax dollars for direct federal investment.

Acknowledgments

The authors gratefully acknowledge support for this project by the Johns Hopkins University 21st Century Cities initiative.

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[87] See Results: OZ Strengths and Weaknesses #4d.

[88] For a discussion of the role pension funds can play in local investment see Baird et al. (2019).

[89] Such a change requires the convening of community development experts, anchor institutions, philanthropies, tax experts, and even communities themselves—to determine the mechanisms and institutions necessary to pool and manage this capital and determine how such tax preference would pass federal securities regulations.

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The Failure of Opportunity Zones in Oregon: Lifeless Place-Based Economic Development Implementation Through a Policy Network

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Abstract

The 2017 Tax Cuts and Jobs Act created a new place-based economic development tool to induce economic activity in identified low-income census tracts throughout the United States. In response, the State of Oregon established 86 Opportunity Zones (OZs) at Governor Kate Brown's direction (Business Oregon, 2020). This report examines the rollout of Opportunity Zones in Oregon and what policymakers can learn from its implementation. It looks at how well Opportunity Zones are understood in Oregon by local governments and economic development agencies and how local governments, local economic development agencies, and the private sector are using and marketing OZs. To assess these questions, we surveyed individuals in the public sector in areas with Opportunity Zones across the state to assess these actions. To supplement the survey, we conducted interviews with private sector actors and shadowed developers in the Portland area to assess their engagement with Opportunity Zones. To analyze the implementation of OZs in Oregon, we used the policy tools and networked implementation literature as a theoretical foundation. We conclude that Oregon lacks a hierarchal system to implement OZs, so the network has to take a more substantial role in implementation. Opportunity Zones are a clear example of third-party implementation; because the government funds economic development activity through tax expenditures, the private sector is taking the leading role in implementing these projects.

Introduction

In response to the 2017 Tax Cuts and Jobs Act call to create Opportunity Zones (OZs), the State of Oregon established 86 OZs at Governor Kate Brown's direction (Business Oregon, 2020). The Governor designated the OZs from a list of low-income census tracts nominated by local governments with an "extraordinarily quick" pace for decisionmaking (Business Oregon, 2020; Wessel, 2021). The state forwarded nominations to the United States Department of the Treasury for final approval. The federal government required states to propose OZs within 90 days, limiting the time available to review census tracts or facilitate public engagement or long-term visioning (Business Oregon, 2020). The quick decisions on designations were made "without really understanding what the brand-new program was" (Wessel, 2021: 170).

Despite the limited evidence of the efficacy of these economic development policies similar to OZs, they are just the latest iteration. Since the 1980s, several place-based policies have existed that mimic the intent of the OZ policy. We have a broad sense of the effectiveness of these policies and their administration. However, the literature is very thin concerning how well these prior policies were implemented, understood, or marketed during their early stages. This report hopes to shed some light on the early-stage implementation of OZs. We hope to improve the implementation of future iterations of location-based tax policy to induce economic development—even if those policies may not be as effective as other types of economic development policy.

This report examines the rollout of Opportunity Zones in Oregon and what policymakers can learn from its implementation. More specifically, we are interested in understanding how well Opportunity Zones are understood in Oregon by developers, local governments, and economic development agencies. Next, we are interested in understanding how local governments, local economic development agencies, and the private sector are using and marketing OZs. To assess these questions, we surveyed individuals in the public sector across the state to assess these actions. In addition to the survey, we conducted interviews with private sector actors, and we shadowed developers in the Portland area to assess their engagement with Opportunity Zones. The report analyzes the OZ implementation in Oregon using a networked governance framework to better understand the successes and failures of this policy. Networked governance is when policies are governed or implemented through a network of organizations, often across levels of governments; this network can also include the nonprofit and private sectors.

The arrangement of the remainder of this report is as follows:

1. We examine some of the lessons learned from the prior place-based tax-based economic development efforts that mimic some aspects of the Opportunity Zones.

2. We dive deeper into Oregon's implementation of OZs. This section also provides a set of research questions that guide the analysis of this report.

3. We then discuss our analysis methods and follow this with a discussion of the findings from this analysis.

4. We provide a set of recommendations for future action on OZs and similar policies in the future.

The Historical Foundations of Opportunity Zones

A historical understanding of how prior economic development efforts with similar characteristics to Opportunity Zones will help us better understand the potential of OZs. Opportunity Zones have similarities to earlier efforts that were deemed necessary in high-poverty, low-employment communities because of what some saw as "market failure—where market forces have not resulted in an optimum allocation of resources to certain kinds of places. Indeed, a lack of access to patient (i.e., long-term), reasonably priced capital has seriously hindered the community and economic development prospects of such places despite the fact that many of them contain valuable assets and viable opportunities" (Abravanel et al., 2013: 9). In urban areas, these market failures are due to a range of past disinvestments due to past and present discriminatory practices in lending/insurance, (perceived) elevated security costs, higher taxes, and white flight (Abravanel et al., 2013). In rural areas, a lack of local banking assets hinders the availability of capital, and those that do exist are more conservative in their lending than those outside the rural areas. Additionally, the low population density in rural areas and inadequate or insufficient supporting infrastructure led to lower quality capital projects that these traditional funding mechanisms support (Abravanel et al., 2013).

Earlier efforts to induce economic growth using tax expenditures have largely failed. The basis for a firm's decision to locate somewhere has many sources and "is far more complex than making a comparison of taxes across jurisdictions" (Clark, 2014: 41). Amenities, quality of infrastructure, quality of life, safety, quality and cost of the workforce, utility cost, unionization, and strength of regulation are all determinants of those decisions as well—and often are placed high above the tax benefits that a project may create for the developer or firm.

We will briefly explore similar place-based efforts and the known results of these efforts; they shed light on what we might expect from OZs. We draw upon the lessons learned from the state-enacted Enterprise Zones in the 1980s, the federal Empowerment Zones/Enterprise Communities (EZ/EC) program in the 1990s, and the New Markets Tax Credit Program (NMTC) of the 2000s. One of the biggest obstacles facing OZs and similar tax expenditure-based efforts to address poverty is that they are all based on the theories of "trickle-down" economics of the 1980s (Jordan, 2020), which historically were not highly successful in economic development.

Enterprise Zones

The British government enacted a nationwide Enterprise Zone (EZ) plan in the 1980s, later emulated by many U.S. states (Jordan, 2020). The Thatcher and Reagan governments' supply-side economics theories ("Trickle Down Economics") influenced the Enterprise Zones design in the United Kingdom and United States. While "Enterprise zones [became] the foundation of the Reagan urban economic development agenda" (Blair, 2002: 166), his administration failed to get support in Congress for EZs (Blair, 2002; Jordan, 2020; Mossberger, 1999).

The EZ approach to economic development uses a different set of tools than traditional economic development policy by aiming to "direct the policy benefits to selected companies within a specific geographic area, stimulating community or neighborhood revitalization as well as business development" (Blair, 2002:167).

Empowerment Zones/Enterprise Communities (EZ/EC)

Following the riots in Los Angles in 1992, the Empowerment Zones/Enterprise Communities (EZ/EC) legislation paired tax incentives with social services support in targeted communities (Jordan, 2020). This multi-tool approach (Salamon, 2002) to implementation is a key difference between the EZ and the EZ/EC approach. The goal of EZ/EC was to use progress toward benchmarks as the indicator of success rather than the amount of money spent on projects. In practice, this became very difficult to measure because each project developed its own set of "baselines, methods, and benchmarks for measuring the success of its plan."; thus, most measures of success were on "outputs" rather than the results of the projects themselves (Government Accountability Office, 1997: 1–2). While that statement may apply to nearly all economic development programs, it is particularly salient for the EZ/EC program because of its particularly poor design. "The relative impact of EZ/EC remains largely unknown" (Jordan, 2020: 75).

Analysis of the EZ/EC effectiveness shows that while empowerment zones could create jobs, the cost per job (in some instances costing more than $100,000 in investment per job) was far too high to justify the investment (Busso & Kline, 2008). To give a sense of the scale of the EZs financial imprint, the estimates of the first round of investments were around $2.5 billion over 10 years in a geographic area that had a population of fewer than 1 million people (Busso & Kline, 2008). Due to the measurement issues previously mentioned, however, and the lack of a clear target, these programs failed to generate the desired economic outcomes.

The New Markets Tax Credit Program (NMTC)

The New Markets Tax Credit Program (NMTC) is the prior policy most similar to the OZs. NMTC was established in 2000 and was reauthorized as recently as 2017. The goal of the NMTC was to use tax incentives "to stimulate economic growth, create jobs, and revitalize low-income areas" (Jordan, 2020: 75), but it did not provide the social services seen in the EZ/EC. The NMTC program is competitive, with the Community Development Financial Institutions (CDFI) Fund making the award decisions (Abravanel et al., 2013). There is a wide range of eligible projects, but most were "office, retail, manufacturing/industrial, and mixed-use" (Abravanel et al., 2013: vii).

The "lack of transparency and data collection by the Treasury Department" clouds the ability to gauge the effectiveness of the NMTC (Qian, 2019). Most studies looking at NMTC indicate modest but positive results of the program. Qian (2019) notes that "NMTC encouraged new investment from individuals, and it seems to have encouraged corporations to shift investment from higher income communities to eligible low-income communities," adding that other studies have seen "modest reductions in the poverty rate and unemployment rate in affected communities." The increasing complexity of the NMTC made "it more difficult to trace the flow of private and public funds and the benefits from the tax subsidies" (Government Accountability Office, 2014: 9) than other programs.

While many developers are willing to take the extra benefits the NMTC provided, a 2013 Urban Institute study shows that only about one-third of the projects needed the program to get underway (Abravanel et al., 2013). Creating a job through the NMTC is estimated at $53,000 per job—a cost much higher than other federal government programs and one that is more than 3

times more expensive than the Earned Income Tax Credit (EITC) (Abravanel et al., 2013; Qian, 2019). The overall impact of the NMTC is negligible because "no change in corporate investment levels in response to the NMTC" was seen as a result of the program (Gurley-Calvez et al., 2009: 371). Individual investors saw some minor benefits, whereas corporate investors did not (Gurley-Calvez et al., 2009). The share of individual investors, however, is a small fraction of all investments made through the program—about 5 percent of the total (Gurley-Calvez et al., 2009).

Opportunity Zones in Oregon

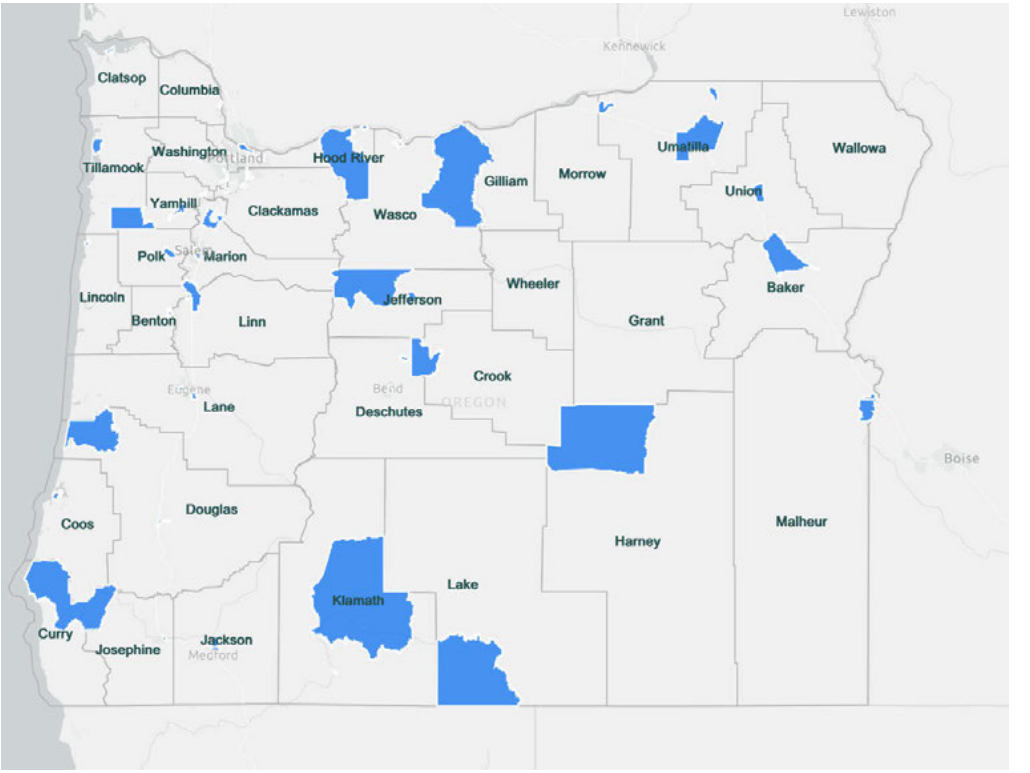
Of the 834 total Census Tracts in Oregon, more than 300 met the Opportunity Zone criteria (Business Oregon, 2020). The Tax Cuts and Jobs Act allowed the state to nominate 25 percent of those tracts for Opportunity Zone designation. In 2018, Oregon established 86 Opportunity Zones across all of the state's regions (see exhibit 1). Thirty-one percent of designated Opportunity Zones are in rural areas, 31 percent are in the Portland Metropolitan Region, and the remaining 38 percent are in other urban areas of Oregon. The justification for selecting tracts within the state was not entirely transparent, likely due to the limited time given for selection and the fact that the legislation had no requirements for transparency. Several studies have demonstrated that quite a few of the projects in Oregon were placed with the intention only to help development projects underway, whereas others were selected to attract purely out-of-state money (Buhayar & Leatherby, 2019; Wessel, 2021). One such project in downtown Portland already had a certificate of occupancy ready before the OZ legislation, yet legally could use the OZ designation to create a windfall for the development's investors (Wessel, 2021). While the designation of which areas get the OZ tag is a state-level decision, local and regional governments in the Portland metro area requested that some eligible tracts not be included out of fear that the designation would exacerbate gentrification in areas of Portland (Buhayar & Leatherby, 2019; Wessel, 2021). In fact, several neighborhood and community groups rallied to keep the OZ designation from their census tracts because their "neighborhood is 'already threatened by outside investment that works against the interests of lower-income residents and people of color,'" and that OZs would "make gentrification even more profitable" (Wessel, 2021: 172). These neighborhoods were left off the OZ selected list.

OZs have, thus far, failed "to incentivize community engagement, preserve affordable housing, and mitigate against displacement. Opportunity Zones may amount to little more than a tax cut for the wealthy that only furthers the economic burden on low-income residents who can no longer afford to live in areas they once called home" (Jordan, 2020: 68). How representative these early findings are, which show minimal impact, is hard to determine because implementation is so recent. Chen, Glaeser, and Wessel (2019: 2) have noted, however, some declines in property values in target neighborhoods.

Oregon is a diverse state. The Oregon Office of Rural Health (ORH) divides the state into urban, rural, and frontier areas (Oregon Office of Rural Health, 2020). Urban areas are population centers with 40,000 people or more, rural areas are areas 10 or more miles from the centroid of a population center of 40,000 people or more, and frontier areas are counties with population densities of six or fewer persons per square mile. Ten of Oregon's 36 counties are designated frontier counties. Using data from Claritas LLC, ORH found that 33 percent of Oregon's population lives in rural areas, 2 percent in frontier areas, and 65 percent in urban areas.

Exhibit 1

Oregon Opportunity Zones



Source: Business Oregon, 2020

Like many states, Oregon has systemic and pressing planning and economic development issues stratified by rural/urban/frontier populations, skilled/unskilled populations, and siloed institutions. While untested and imperfect in implementation, Opportunity Zones appear to offer an opportunity to provide marginal financial incentives that could allow the remediation of some of these barriers within Oregon and nationally.

Opportunity Zones in Oregon, however, and the state legislation aimed to remedy perceived problems, have received considerable negative press (Hauser, 2020; Hauser & Ordóñez, 2019; HB2428 2021 Regular Session - Oregon Legislative Information System, 2021). Thirty-one percent of the 86 OZs within Oregon reside in rural census tracts. Rural communities across the United States, including Oregon, have struggled economically for decades. They face systemic challenges like an aging population, population loss, non-diverse local economies, and difficulty attracting industry; they are often not economically viable. Real-estate development projects in rural communities are usually too small to attract big investors. A small project of only a few million dollars in a rural area will also have more difficulty attracting funding than a multi-hundred-million-dollar project in an urban area. Wessel (2021: 192) notes this same issue when speaking with several foundations in Oregon: "Portland would attract money…The challenge would be

channeling some money to other parts of the state. Left alone, the market wouldn't do it." These efforts were described as "a flop" because "identifying promising projects in smaller communities across the state proved difficult," and finding investors "was no easier" (Wessel, 2021: 193).

This difficulty in attracting projects within a rural Oregon OZ stems from the systemic barriers to acquiring labor, materials, and adequate rents (Steckler, 2017). Long distances from materials and long commute times eat away at project returns and jeopardize fulfilling the Opportunity Zone legislation requirements. Additionally, given the comparatively little demand for housing than a larger municipality, rural communities often cannot charge rents that provide an attractive return (Steckler, 2017). Because of these additional barriers, the marginal return on a project in a rural area is usually smaller than that of an urban area, and projects are generally riskier. These challenges also require that government (state and local) in Oregon take a larger role than might be seen in more densely populated areas of the United States.

In this report, our goal is to examine Oregon OZs and explore how public and private entities within the state have approached implementing the Opportunity Zone legislation. We address three primary research questions:

- How well are Opportunity Zones understood in Oregon by local governments and economic development agencies?
- How are local governments and economic development agencies using and marketing OZs?
- How is the private sector navigating OZs in Oregon?

The report emphasizes how urban, rural, and frontier areas capitalize on their Opportunity Zones.

Opportunity Zone Implementation

To better understand the analysis presented in this report, we draw from the policy tools and networked implementation literature. The tools used for policy implementation are varied (Salamon, 2002), so understanding how the less direct means of implementations in OZs in context is essential. In this report, we examine the indirect implementation of economic development policy. OZs use the tax code form of implementation—a class of policy tools commonly known as tax expenditures. Tax expenditures include tax credits, tax abatements, and tax deductions. Since colonial times, they have been used for economic development through "public investments via tax abatements and credits, infrastructure investments, and workforce training" (Clark, 2014: 37); their use increased dramatically, however, after World War II.

Opportunity Zones are implemented through networks. Implementation networks are a way to look at control over policy implementation in contrast to strong hierarchal control found in many government programs. O'Toole and Meier (1999) have noted that the lack of strong hierarchical control of policy implementation indicates that policy is then implemented through a network. In hierarchies, governments have "formal authority to compel" through a "stable set of relations" (O'Toole & Meier, 1999: 508). The formal structures imbedded in traditional hierarchies "makes it possible to coordinate the efforts of many toward the achievement of common purpose without

overwhelming the capacities of individual decisionmakers," yet this formal structure can hinder outcomes and does not always provide the flexibility needed to implement policy (O'Toole & Meier, 1999: 508). In the hopes to take advantage of the vast heterogeneity of economic conditions and potential solutions to address the economic despair at the local levels, a set of programs have been implemented using a network of actors, subsidized through the tax code, to achieve goals that have often seemed elusive through traditional policy implementation. Blair's (2002) evaluation of Enterprise Zones across the U.S. confirms the key findings of O'Toole and Meier concerning these public-private networks.

Policy implementation through networks requires a different set of management and oversight tools than hierarchical implementation. This type of policy implementation is more susceptible to environmental shocks to the system (O'Toole & Meier, 1999). The stability and consistency of implementation of the policy through network mechanisms go from highly stable (typical hierarchy) to completely networked (and less stable) (O'Toole & Meier, 1999). The network itself is more adaptable to innovation and change in its environment, but this comes at the expense of being overwhelmed, potentially, by these changes. In the context of OZs, the stability of organizations involved in the process is also quite different from the network's stability. The networked approach to implementation has less stability given the less stable environment they are working in and the susceptibility to external shocks. Blair (2002) suggests that state governments sought to improve the stability of the network by implementing earlier policies similar to OZs by increasing the state's involvement in the networks to increase the level of private sector investment. This, of course, appears to be antithetical to the goals of these free-market-oriented policy structures, but it provides a pragmatic realization of the instability of the networked implementation.

To overcome these barriers to successful implementation, the incentives for continued participation in the network will have to be greater than the incentives for non-participation. Furthermore, in the case of OZs, the savings and/or subsidies must be financially sufficient to keep them in the game when implementation is inevitably shocked by the environment. Since OZs are incentive-based, rather than punitive or regulatory, it is vital to understand that there may be tools policymakers can use to supplement financing, including reducing red tape (Bozeman, 2000; Bozeman & Feeney, 2011) or administrative burdens (Herd & Moynihan, 2019) to induce this continued engagement in the implementation by these private actors. These shocks may include changes to the economic outlook, changes in the real estate market, political dynamics, or leadership, among other adverse circumstances. The COVID-19 pandemic introduced all of these to OZs in Oregon and had devastating impacts on the implementation.

The complexity of a networked environment of policy implementation could have the effect of pushing more novice, less experienced, or economically weaker actors out of the network. The desire to stay in the network and absorb the shocks from outside is expected to be inverse to their role within the network (O'Toole & Meier, 1999). This is compounded when the size of the network grows. In the case of Opportunity Zones, we look at a statewide implementation occurring between sectors (local governments, developers, and OZ funds), while most of the specific projects themselves are taking place within just one or perhaps two local jurisdictions.

Many of these tax expenditure schemes have a limited time duration for implementation. This means that when we expect a policy implementation through a network of actors, trust between the partners is even more critical (O'Toole & Meier, 1999). Networks tend to be less permanent, but some networks for policy are designed to be longer lasting than others. In the case of the OZs, the time horizon is relatively short. OZ partnerships may include partners that have not yet worked together, actors in other jurisdictions, and actors with competing interests. What we would expect to happen as the policy is implemented based on this theory is that, until the interactions become repeated over time, the ability to generate cooperation between actors is challenging, at best (Ostrom, 1990). The expectation in the design of OZs is that this is essentially a one-time game. Thus costs of coordination and collaboration are much higher—and may also increase the need for more support, subsidization, or incentives to stay in the network.

The public benefit of many of the proposed OZ projects in Oregon—workforce housing, for example—has spurred many local governments to try and draw the private sector into these projects. This may not be the case in other parts of the country that do not see their economies stifled by the lack of affordable housing, but this is very much the case in Oregon. Private sector organizations in these networks have options for other developments to pursue. They do not have to cooperate with others (public or private sector) to build a new apartment building or shopping center. However, the government actors need private or nonprofit sector actors to act as partners to implement the OZs since public organizations do not need tax expenditure benefits—nor could they use them if they were available.

The tensions and challenges of networked policy implementation are clear from the historical record of EZ/EC, NMTC, and Enterprise Zones. This theoretical framework described previously will help us to better understand the findings from our survey, interviews, and shadowing of OZ stakeholders in the state of Oregon.

Methods and Data

This research builds from two primary data collection methods: (1) a survey of Oregon municipalities that have Opportunity Zones; and (2) interactions with two of the three actors in the network (developers and funds) through a "shadowing" process.

Survey

We distributed a survey to municipal and county planners, city managers, mayors, and economic development professionals within Opportunity Zones to understand the knowledge and use of Opportunity Zones within Oregon among government agencies. The League of Oregon Cities aided the researchers by providing a mailing list of local officials, which was further narrowed to only a subset with Opportunity Zones within their jurisdiction. The complete list of individuals comprised 86 planners, mayors, managers, and other public officials and administrators in Oregon. In addition to using the League of Oregon Cities, the Oregon Economic Development Association sent an email solicitation to members on this report's behalf.

A total of 54 individuals responded to the survey, and 43 fully completed the survey. Forty-six of the respondents provided location information; of these, 26 (57 percent) are rural, 13 (28 percent) urban, and 7 (15 percent) frontier. The Oregon Office of Rural Health (ORH) provides definitions of the population density of Oregon cities and counties (ORH, 2020). ORH defines rural as a geographic area 10 or more miles from the centroid of a population center of 40,000 people or more. Frontier is defined as any county with six or fewer people per square mile. ORH classifies 10 of Oregon's 36 counties as frontier (Oregon Office of Rural Health, 2020).

This report relies upon the perspectives of individuals who would promote and understand Opportunity Zones in the public realm rather than people outside of OZs. This approach ensures that the sample of individuals obtained from the implemented survey accurately reflects the utilization and dissemination of Opportunity Zone knowledge within the state.

This survey was administered using Qualtrics and shared through the University of Oregon and the Institute for Policy Research and Engagement. We accepted survey responses from mid-March until the end of April 2020. The survey was 36 questions long and took about 10 minutes to complete. The University of Oregon's Institutional Review Board approved the survey before distribution.

Shadowing

To complement the survey results, we shadowed the creation of a private workforce housing group in Portland, Oregon. The shadowing campaign started in late 2019 and continued until the COVID-19 pandemic led to lockdowns in March 2020. The group aimed to implement workforce housing across the state of Oregon, using OZs to attract investors. Socially responsible investing by meeting unmet housing needs was also an objective.

The workforce housing group included a real-estate attorney, a tax attorney, a private investment group, a CPA, a workforce housing development contractor, and a prominent investor from a wealthy Oregon family. The prominent investor group member initiated the idea of a workforce housing group to engage philanthropically and expand the availability of workforce housing throughout the state. Frustrated with navigating Portland's regulatory environment, this individual sought out an attorney to begin implementing workforce housing throughout Oregon, primarily in rural Oregon; however, they considered all communities with Opportunity Zones if they had viable land. By shadowing this team and analyzing their methods to creating a viable company, a direct and real-world perspective of how private industry in Oregon utilizes Opportunity Zones was experienced.

Each team member played a crucial role in facilitating the workforce housing group's mission. The real-estate attorney used existing connections and previous knowledge of the Oregon real-estate environment to form the group and generate company operational and funding mechanisms for using Opportunity Zones. The tax attorney provided a systemic understanding of the Opportunity Zone legislation and connections to heads of municipalities and planners throughout the state. The investment group acted by reaching out to property owners and cities that had Opportunity Zones. They educated them on what Opportunity Zones are and what personal and community gains they sought to receive by utilizing them. The CPA ensured that generated frameworks complied with

the regulatory guidelines of the Opportunity Zone legislation. Moreover, the prominent wealthy family member provided connections to investors and was seen as "a spiritual guide" for the group by ensuring that its mission was to provide reasonable housing to populations without reasonable means to acquire it.

Results

We organize the results around the three key research questions using the networked implementation framework:

- How well are Opportunity Zones understood in Oregon by local governments and economic development agencies?
- How are local governments and economic development agencies using and marketing OZs?
- How is the private sector navigating OZs in Oregon?

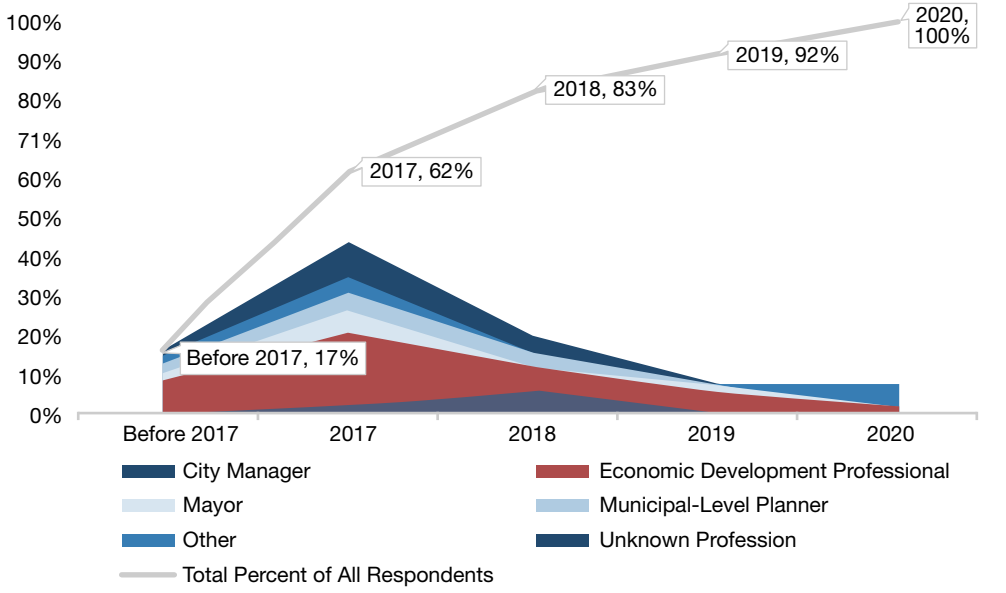
For purposes of describing the results, the key actors in the OZ network in Oregon are (1) public sector entities, (2) OZ funds, and (3) developers. Each has a unique role in the network. Public sector entities establish, manage, and market OZs. Forward-thinking communities like Erie, Pennsylvania, have identified a pipeline of potential projects, assessed project viability, and published the results in an OZ prospectus targeted at fund managers and developers (City of Erie, PA, 2018). We are unaware of any community in Oregon that has developed such a sophisticated approach to the OZ program. The role of fund managers is clear—they finance the projects. Developers implement projects. Without interaction between the three actors, OZs do not work.

How Well Are Opportunity Zones Understood in Oregon by Local Governments and Economic Development Agencies?

Our first research question asked how well stakeholders understood Opportunity Zones. The 2017 Tax Cuts and Jobs Act created Opportunity Zones. Consequently, we did not expect many stakeholders to be aware of OZs before this date—although the concept was floated during the Obama Administration, and thus our finding that 17 percent knew about OZ in a year before its passage is not surprising. It is also conceivable that these individuals confused OZs with another similar policy. Exhibit 2 shows the cumulative awareness of our survey respondents of OZ, along with a breakdown of their professional identification. Unsurprisingly, individuals in the economic development field were more likely to be aware of OZs earlier than other professions. Non-economic development professionals found out about Opportunity Zones later than economic development professionals. Non-economic development professionals did not find out about Opportunity Zones through economic development professionals. These findings demonstrate that OZs have penetrated essentially all corners of the public sector stakeholders that might use this policy tool as of early 2020.

Exhibit 2

Year Respondents Found Out About Opportunity Zones by Self-Identified Profession

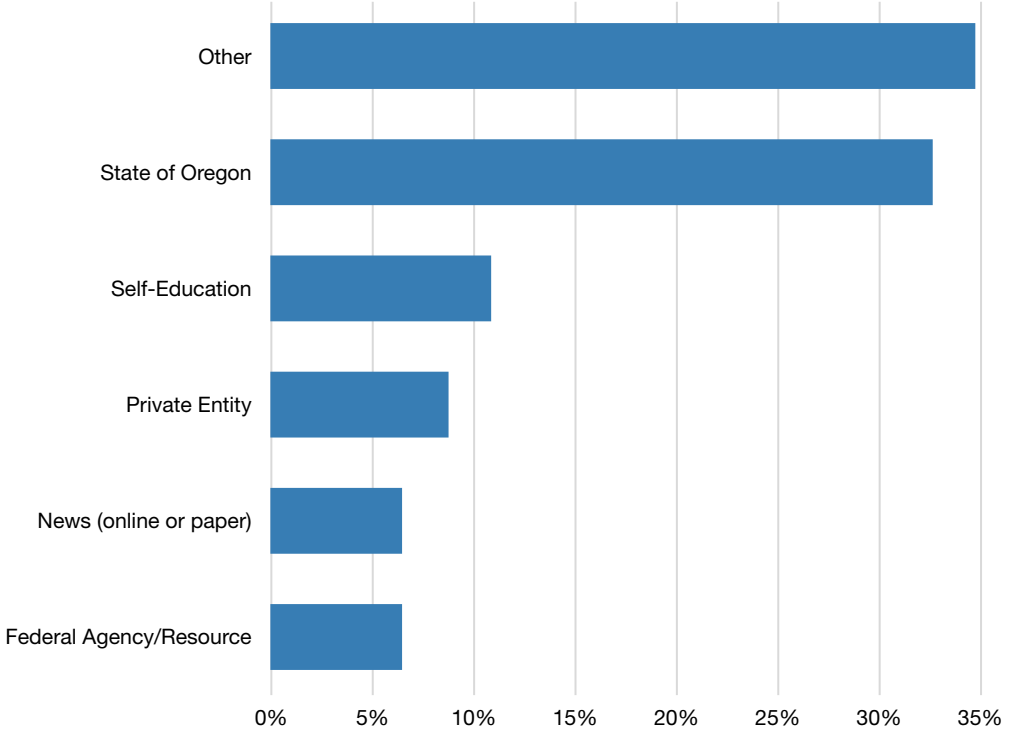


Source: Authors' calculations

In ascertaining the source of respondents' knowledge about Opportunity Zones, we asked them how they initially found out about Opportunity Zones (Exhibit 3). Thirty-one percent (15 respondents) indicated that they learned about OZs from the State of Oregon. The most frequently selected source was "Other," with 33 percent, or 16 respondents. Our data collection through shadowing and interviews mirrored the survey results. There is a wide range of variability of respondents knowing who selected Opportunity Zones or how they work. This is also reflected in our observational work with the workforce housing group. A non-trivial number of survey respondents indicated that the first time they had heard about OZs was from our survey itself.

Exhibit 3

How Did You Initially Find Out About Opportunity Zones?

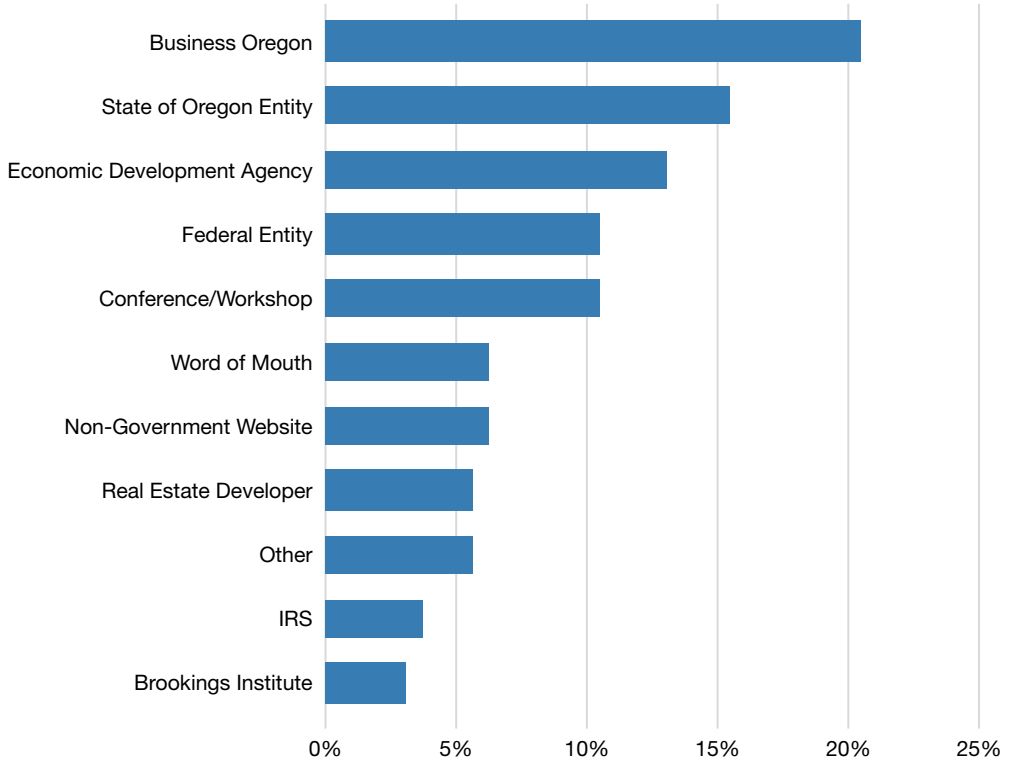


Source: Authors' calculations

In addition to ascertaining respondents' source of OZ knowledge, the survey also strived to understand where respondents gathered continual sources of Opportunity Zone information. Forty-eight percent stated that they got it from Business Oregon, a state economic and business development entity, or an economic development agency. Exhibit 4 shows all the selected sources of continuing information.

Exhibit 4

Count of Where Do You Get Information on Opportunity Zones?



IRS = Internal Revenue Service.
Source: Authors' calculations

The respondents used varying resources to stay abreast with Opportunity Zones' progress, but there is no single source, nor are they all Oregon-centric sources. Business Oregon was the most commonly cited source of OZ information. Results suggest Business Oregon could significantly increase educational outreach to communities and teach public officials frameworks and tactics to solicit Opportunity Zone projects from funding *within* their jurisdictions.

Seventy-six percent of respondents, or someone within their organization, had done some research to understand the benefits of OZs better. In comparison, 18 percent had indicated that they had not done any research, and 6 percent were unsure. This finding suggests that most public-sector individuals in the network sought to discover if OZs could benefit their communities. Even though most public-sector actors had researched the types of benefits that OZs might provide, our analysis demonstrated that many actors did not know any specific OZ projects. We also found that, of projects that they were aware of, they were not aware of the specifics. In short, the survey results indicate that respondents want to use OZs but do not know how to do this in practice. The inability of the organizations or individuals to translate their desires into action demonstrates the complexity of OZs and policy implementation challenges through a networked structure.

During our shadowing, we discovered that the investment arm of the OZ startup firm went to municipalities to discuss implementing workforce housing in their jurisdictions using OZs to fund the projects. Much of the time in the meetings was spent explaining what OZs are. Even on repeated visits to the same municipality, time was spent on re-explaining the operational framework of OZs and what would be practical applications of OZs in the community. These repeated occurrences of explaining OZs to local planning and administration authorities prevented progress in implementing OZ projects in these municipalities. The workforce housing group eventually contacted individual property owners to identify OZ projects and funds without municipality influence. We also found that while there is enthusiasm to learn how to use Opportunity Zones, there is no clear distinct and touted service in Oregon for stakeholders to look to as a successful example.

In sum, it was clear that many organizations across the state of Oregon that *should* know about OZs knew about them. The complexity of the implementation mechanism for this policy has hindered how much people knew about them. No single entity took charge to create a clear communication channel to stakeholders across Oregon to assure that actors throughout the network knew OZs. Implementing policies through a network (such as the combination of public, private, and nonprofit sector actors involved in OZs) requires additional effort to ensure success. Despite the efforts of the startup firm we shadowed, their efforts often seemed in vain because there was not sufficient public-sector support to clarify how the policy could or should be implemented.

How are Local Governments and Economic Development Agencies Using and Marketing OZs?

More than 60 percent of the public-sector survey respondents believed that OZs could facilitate projects in their community. Nearly one-third of respondents, however, were unsure of their potential. This finding indicates an incoherence with the utility of OZs for a sizeable share of stakeholders in the state. Stakeholders who do not have dedicated economic development staff are more likely to say that OZs are not a tool that they could use by 13 percentage points compared to those with economic development staff. This points to the need for capacity within organizations dedicated to understanding the role of OZs in economic development. This key human capital role is only present in 60 percent of the surveyed organizations (nearly one-half of the respondents were economic development professionals). This finding may point to an essential role in future legislative efforts to assure that there is sufficient capacity within the public sector to understand the role that an OZ-like policy might be able to play in a larger space of economic development in order for these types of policies to be successful.

Less than 40 percent of local governments we polled had formalized pathways to connect with the private sector. Moreover, when we look at the role of having a dedicated economic development staff member to further the goal of OZs, we find a strong relationship between the absence of someone in that role and the likelihood that the local government has established formalized avenues for private entities (Chi-Sq p=0.024). This points to a weakness in policy implementation through a weakly formed network rather than more hierarchical structures. Without the formal structure, the implementation in many rural, sparsely populated areas of Oregon (and other states) cannot proceed unless there is a sufficient flow of information about the need or utility of the

OZs. This is because the nature of the types of projects that OZs might help along require multi-sectoral cooperation and coordination in ways that are unnecessary for urban areas, where density and capital can push projects toward completion without coordination. The lack of information flowing from the public sector to private sector firms about OZs is evidence that this policy would have been more successful if public sector partners were better positioned to provide accurate information and technical assistance. Projects in Portland are going ahead because there are few that " would not have been built if not for Opportunity Zones," but this is not the case in the communities "that proponents of Opportunity Zones said they were trying to help OZs aren't doing much at all" (Wessel, 2021: 199).

The state and local governments see affordable housing as a huge challenge that dampens economic development in the state. OZs have been seen as a way to induce more of this type of housing. Thus cooperation across sectors (developers, OZ funds, local governments, housing authorities, etc.) in the implementation is particularly important in Oregon. Additionally, the multi-sector design of the networked implementation of the OZs creates higher transaction costs for developers and governmental actors alike (Coase, 1960; Williamson, 1981). It is harder for each entity to learn about the policy (such as search costs) and understand the benefits appropriately. These challenges are amplified when population density is lower and economic opportunities are further apart, as is the case in rural and frontier counties.

Exhibit 5

Responses to Survey Questions from All Respondents Across All Professions

Question	Yes (%)	Unsure or Don't Know (%)	No (%)	n
Do you think Opportunity Zones are a tool that can facilitate desired projects in your community?	61	32	6	49
Does your local government have any formal avenues for private entities to utilize Opportunity Zones?	38	49	13	47
Does your municipality/county have a dedicated economic development staff/staff member?	38	2	60	42

n = number of respondents.

Exhibit 5 illustrates the responses from public entities that operate in Opportunity Zones in Oregon. In total, there are 54 respondents; however, the maximum sample out of the previous question is 50, and the minimum response is 41.

During our shadowing of the workforce housing group, a group member advocated for creating a regional project bank where rural projects could be aggregated and made more profitable by reaching economies of scale. Creating a banking mechanism would help buffer the shocks in rural areas by giving them a more extensive network to operate. The larger network could provide additional human and financial capital to the projects, which would increase their chances of success. While this was suggested, we should note that this mechanism has not been created or used in Oregon.

How is the Private Sector Navigating OZs in Oregon?

Generally, the private sector saw the value of leveraging its goal to be more socially responsible because of the OZ designation. They also saw the OZs as a way to improve the viability of the projects they were proposing because of the OZ designations. The lack of affordable housing, in particular, is increasingly hurting all sectors because many middle-class, two-income families cannot afford housing in many parts of the state of Oregon. The workforce housing group believed that OZs could be vital in attracting private capital to projects that might not otherwise find funding. They saw the local and state governments investing in low-income housing but paying little attention to missing middle housing. They saw OZs filling in some of this gap by making the projects replicable across the state.

While shadowing the housing group, we discovered that due to the time and effort required for finding properties, interested municipalities, and compatible sites, the only way that the group members could implement housing projects through OZs and cover their costs would be if municipalities were willing to waive site development fees. These fees vary based on project type and jurisdiction, but in the state of Oregon, they tend to range from $10,000 to $50,000 or more for a single-family residential unit. Municipal governments use site development fees to recoup the costs of providing infrastructure to new developments. These fees may include a plan review fee, a site development permit fee, and other systems development charges that would fund improvements in infrastructure for the site. This results in an unfunded mandate on local governments that host these developments.

The shadowing interviews also revealed that the housing group members generally felt that working with small rural municipalities was easier than urban municipalities because of their less stringent regulatory environment and the direct interactions that the private sector players could have with community leaders. This direct interaction helped the developers to feel as though the projects were built more solidly on trust. This embedded trust helps lower the transaction costs of the negotiation between project partners (Coase, 1960; Williamson, 1981) that may come out of the OZ-based developments. The tradeoff of looser regulatory environments and a network with closer ties were not enough to activate enough projects to consider OZs a success to date.

The challenges of implementing OZs across the state of Oregon are real. In some rural communities, no matter the project, a return to scale that attracts investment is unattainable—"unless you have an investor in need of a tax deferral that is also a philanthropist willing to take a very small return" (Wessel, 2021). The tax incentives associated with Opportunity Zones are not large enough, and other public subsidies would be required to make projects viable. This limitation is a real issue for rural communities across the country and was an issue in prior similar efforts, like NMTC and EZ/EC. Implementing policy through a network requires that the network carry out implementation despite external or environmental shocks. The responsiveness of a system to these shocks, or its ability to buffer these shocks, is weaker in networked governance structures like the one we are studying in this report (O'Toole & Meier, 1999). Since the private sector is more open to the external environment through their profit- and market-driven focus, they will "need to respond to the environment effectively or lose market share," and this creates a need for these organizations "to adapt rather than buffer" (Meier & O'Toole, 2011: i291).

In contrast, public sector organizations "have massive processes to buffer the environment" (Meier & O'Toole, 2011: i291). This buffer means that the failure or success of the policy as a whole is more likely to be sustained by the external environment of private organizations involved in the implementation of the policy. This means, for OZs, that we might expect that the heterogeneous implementation at the local level, through a loose set of public, private, and nonprofit sector actors, would be unstable.

Conclusions and Recommendations

Oregon lacks a hierarchal economic development policy, particularly with the implementation of Opportunity Zones. Consequently, the network has to take a more substantial role in implementation. Opportunity Zones are a clear example of third-party implementation. Because the government funds the economic development activity through tax expenditures, the private sector is taking the leading role in implementing these projects. So far, the results of OZs in Oregon mimic those of other efforts to use tax expenditures to fund economic development—they play a minimal role in economic development across the state. While tax expenditure policy often creates outcomes that are hard to measure, in the case of Oregon's OZ implementation, the number of projects is so tiny that it is reasonable to say that the promise of the legislation is failing to deliver on its potential.

Field experience supports this finding. Stephen Brooks led an effort to develop a platform to link elements of Oregon's network together. In reflecting on the experience, Brooks concluded, "Oregon (still) lacks a coordinated, infrastructure-based approach to resource deployment. I interacted with numerable associations, committees, agencies, private stakeholder groups, consortiums, and the like, throughout the process of establishing this OZ infrastructure. Despite universal interest in the OZ initiative, and strong expressions of interest in utilizing OZ for local community and economic development, it proved nearly impossible to widely deploy, on a coordinated and robust basis, the integrated statewide system we developed" (S. Brooks, personal communication, May 11, 2021). In summary, all the relevant parties have to participate in efforts to implement OZs. Moreover, achieving locally targeted outcomes requires communities to identify investable projects, willing investors, and skilled fund managers.

The immaturity of Oregon's implementation network has led to substantial challenges. Brooks (personal communication, May 11, 2021) has noted that most local, outcome-focused stakeholders are not familiar with how private investors make decisions. While OZs provide a more flexible tool for communities with a wide range of needs, the lack of a strongly activated network across the state led to very few projects getting off the ground. The consistent message we heard from the private sector was that their local and state partners had to be continually educated about what OZs were; their methods of operation demonstrated that these governments did not have sufficient resources to aid the private sector. Communities commonly express the fear that developers will start snapping up properties in disadvantaged communities before the community has time to put a project together (S. Brooks, personal communication, May 11, 2021). This lack of experience with what to expect from outcomes is intrinsically tied to the network's struggles. Brooks (personal communication, May 11, 2021) reported that the public and private sector stakeholders continue

to have different expectations of the outcomes of OZs, which further stresses the effectiveness of networked implementation.

The localities that have made investments in dedicated economic development staff members were in much better positions to activate and sustain the network necessary to implement OZs. Future policies that seek to use this tax expenditure and networked implementation might benefit from a more hierarchical technical assistance and guidance structure. Many local governments did not create an environment that helped facilitate these projects because they lacked an understanding of the mechanisms, and they did not have the staff to support them.

The finding that developers found the rural environments more favorable to these projects is telling, given that these localities often had few technical experts on municipal government staff. One could debate whether any of these sparsely populated areas are ripe for an OZ-styled policy. However, success in these areas requires coupling network support and technical assistance to the funding itself. The OZ system implicitly assumes that viable projects will exist in every OZ and that a network will develop around these opportunities. Our data suggest that in most OZs in Oregon, these two assumptions do not hold.

Additionally, the size of the incentives was often not large enough for players to be enticed to the table or stay at the table long enough for the target neighborhoods to feel the benefits. Working to attract private investments that couple with these tax benefits, policymakers need to recognize that the sole purpose of many of these private developers is to make money, not social change. While there are developers with a more social benefit mission, none of the partners will stay at the table if participation costs are higher than these benefits. Tax incentives alone do not create jobs or facilitate new housing construction, though they may create a nudge for projects on the edge of viability. Tax expenditures on their own from the federal government may require, as our study revealed, that local governments may also reduce the fees that they collect (impact fees, etc.) if the projects are to pencil out for these private developers.

Taxes and fees are not, however, the be-all and end-all in economic development. The findings from other studies have shown similar findings to those we observed. The limited impact of OZs is potentially a sign that the problem is more than a lack of "capital subsidies," but instead a sign that we "need investments in human capital and neighborhood amenities" (Chen, Glaeser, and Wessel, 2019: 11).

The state ought to think about how to build up these local economic development networks of public, private, and nonprofit sector actors over the long run so that trust in the network is high, expertise is built-in, and cooperation is already the norm. Reducing the financial, opportunity, and transactions costs will be essential to future iterations of this style of economic development policy. Knowing that a complex implementation was underway, using a policy that their public sector partners did not fully understand, was one that had a high risk of failure for the private sector—even with the promise of lower financial costs associated with proposed developments. This collective learning effort is not isolated to OZ implementation but seen in other public sector projects over the years (Krueger and McGuire, 2005). The reason that the coordination across the sectors is so important is that the type of interactions inherent in OZs for them to be successful,

especially in rural areas, is that the static capacity of these sectors by themselves is not sufficient for success. The frequency with which these partnerships occur is too low, and the depth of the organizations is insufficient to be confident that we would see success regularly. Having support built into the economic development system across the state would give the success of OZs and similar policies a fighting chance.

The literature on networked governance would suggest that building and investing in more structures to encourage the efficient management of these programs is critical for their success. Governments should be supporting the growth and interconnections of the network players so that the outcomes will be more directed and consistent. A number of means can accomplish this, but one such step would be to increase the time between the program's start and expected completion. The goals of selecting designated OZs and starting projects had far too short of a time horizon for appropriate networks to develop to respond to the policy. This left incomplete planning and poor targeting in its wake.

This report is not likely to be the last word on Opportunity Zones in Oregon or the United States. We suggest that moving forward, the federal, state, and local governments take research on the topic more seriously ahead of time and design evaluations into the legislation more seriously. For example, Bartik (2002) has argued that not only should we evaluate economic development projects more frequently, but that the task is not nearly as difficult as it often seems. Randomized controlled trial studies (RCT) have a place in evaluating these programs moving forward, but they require action by those implementing these programs to ensure that these types of studies are introduced earlier in the process (Bartik, 2002). Future studies on how much different parties knew of OZs, how they are being used, and how effective the legislation has been in spurring economic growth, should consider the features of RCT in designing evaluation tools. RCT can also be used to evaluate the effectiveness of specific tactics, messaging, or approaches to implementing policies like OZs through networks. Network policy delivery is here to stay, and we need to be conscious of the implications of this implementation method.

Acknowledgments

The authors wish to thank Stephen Brooks and Wayne Patterson for their assistance and insight on the project.

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A Typology of Opportunity Zones Based on Potential Housing Investments and Community Outcomes

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The views expressed in this article are those of the authors and do not represent the official positions or policies of the Office of Policy Development and Research, the U.S. Department of Housing and Urban Development, or the U.S. government.

Abstract

The Opportunity Zones tax incentive is a decentralized, large-scale, flexible, federal place-based initiative intended to bring investment to historically underinvested communities across the United States. Although the eligibility of Opportunity Zones was based on certain criteria, every state developed its own process for recommending eligible census tracts for designation. This fact, along with the diversity in the characteristics of eligible census tracts, led to broad variation across designated Opportunity Zones. This variation means that evaluating the Opportunity Zones incentive will require different approaches for different types of communities. Using a combined principal components analysis and cluster analysis approach, the authors developed a typology of Opportunity Zones based on designated tracts' characteristics around socioeconomics and housing markets. Five types of Opportunity Zones were identified and described as, in order from most to least represented, (1) rural, small-town, and tribal communities (36 percent of OZs); (2) underinvested majority-Black communities (26 percent); (3) suburban majority-Hispanic families (19 percent); (4) growing job hubs (13 percent); and (5) metropolitan immigrant communities (6 percent). Potential investment outcomes and community outcomes for each type, and considerations for evaluating each type of Opportunity Zone, are discussed. This typology may be useful for Opportunity Zone stakeholders interested in housing investments and researchers conducting future evaluations of the incentive.

Introduction

Opportunity Zones (OZs) represent the latest, largest, and most flexible federal place-based tax incentive to encourage economic development in historically underinvested and distressed communities. Transactions in Opportunity Zones eligible for capital gains tax reductions or deferrals cover a spectrum of investments, from commercial and multifamily real estate and infrastructure developments to investments in businesses throughout their lifecycle, from startups to later-stage companies.

The Executive Order under the Trump administration that established the White House Opportunity and Revitalization Council, helmed by the U.S. Department of Housing and Urban Development (HUD), included a clause to evaluate the data, metrics, and methodologies that can be used to measure the effectiveness of public and private investments in urban and economically distressed communities, including qualified Opportunity Zones.[1] The feasibility of a comprehensive evaluation of the Opportunity Zones incentive is challenging due to constraints around the availability of data for investments in designated Opportunity Zones, which are either using or not using the tax incentive. To this end, this article provides a nuanced approach for future evaluation of the Opportunity Zones tax incentive through a typology of designated neighborhoods, drawing from literature on housing markets. Opportunity Zone tracts and clusters are categorized for the practical purpose of understanding that success will look different for different baseline scenarios. Each type of designated community may require different evaluation approaches and different thresholds of success, though they will focus broadly on employment, housing, and income outcomes. A differentiated evaluation approach is necessary given the heterogeneous, decentralized, and flexible scope of the incentive.

This article focuses on housing investment outcomes rather than operating business outcomes or other types of real estate or infrastructure investments. The majority of publicized transactions in Opportunity Zones in the first years of the initiative are in residential real estate (Novogradac, 2021). HUD is also interested in understanding potential housing outcomes in these census tracts.

What types of housing investments will Opportunity Zones attract? Investors driven by profit alone will look to Opportunity Zones where they can make the highest positive returns on their investment. Potential returns may depend on factors such as expected future demand and elasticity of the housing supply, which are affected by issues such as vacancy and zoning, as well as other housing regulations (Patrick, 2021). Impact investors, on the other hand, are driven by additional factors, including social or environmental impacts. Potential housing transactions include the construction or substantial improvement of rental housing and owner-occupied housing under various ownership structures. These housing units vary from single-family to multifamily housing developments, which could be affordable housing, market-rate housing, mixed-income (affordable and market-rate housing), or mixed-use (multifamily with other commercial uses). An expansion of the housing supply could subsequently have effects on land values and housing prices. Other

[1] "Section 3(f): evaluate the following: ... (vi) what data, metrics, and methodologies can be used to measure the effectiveness of public and private investments in urban and economically distressed communities, including qualified Opportunity Zones." Exec. Order No. 13853, 83 Fed. Reg. 65071 (December 12, 2018). https://trumpwhitehouse.archives.gov/presidential-actions/executive-order-establishing-white-house-opportunity-revitalization-council.

indirect impacts may follow, including changes in welfare among existing residents and future residents, based on where they may live, and the effect of housing prices on their income or wealth.

What are other types of community outcomes foreseen to transpire as a result of Qualified Opportunity Fund investments along with other capital investments in Opportunity Zones? First, it will be essential to establish baseline scenarios for each neighborhood and to understand the distribution of existing community characteristics. A robust evaluation would consider the outcomes for different types of households in turn, particularly for vulnerable groups, including racial and ethnic minorities, older households, families, and other households that may have particular needs. Examining changes in the makeup of the community is essential to understanding whether Qualified Opportunity Zone investments—and potential benefits from such investments—are going to long-term residents, incoming residents, or combinations of both, which has implications for the discourse around potential gentrification and displacement and the bearers of these impacts. The nature of defining *benefits* varies from community to community and can only be understood in the context of the local place and those in the community.

Differences between Qualified Opportunity Fund investor types and their depth of engagement with community stakeholders, the presence and involvement of community-based organizations, and general indicators of social and community capital and resilience may affect the extent to which investments are considered to be providing benefits to the community. Some researchers have already taken this into account; the Urban Institute developed a tool drawing on nine other social impact tools that grade Qualified Opportunity Fund investment projects based on their potential community impact (Greene et al., 2020). This framework includes specific questions for developers of proposed projects, data that would not necessarily otherwise be collected. Shaping these kinds of frameworks for different types of designated Opportunity Zones will ensure a more robust evaluation.

There are other key considerations to keep in mind for evaluation. When evaluating the Opportunity Zone tax incentive, it will be important to distinguish between investments with little additional benefit from the tax incentive and those that would not have occurred ***but for*** the Qualified Opportunity Fund investment in the capital stack. Qualified Opportunity Fund investments in one Opportunity Zone may also have spillover effects in another neighboring designated Opportunity Zone. That would depend on the scale of the project and other capital investment (private or public) occurring alongside investment from Qualified Opportunity Funds or those with capital in this capital stack. Many states also implemented paired incentives. A future evaluation would require specific project and business capital stack data for investments from Qualified Opportunity Funds and investments without this funding in the capital stack. However, evaluating the Opportunity Zones incentive requires understanding baseline neighborhood characteristics and trends before any investment.

Baseline Characteristics of Opportunity Zones

Opportunity Zones are a designated group of census tracts that provide direct federal capital gains tax benefits for investments made following IRS guidelines. A total of 8,764 census tracts were designated as Opportunity Zones, including 7,826 in the 50 states plus the District of Columbia

and 938 in U.S. insular areas.[2] The designations have spurred additional state and local incentives to mirror or enhance the federal designation and tax incentive. These incentives range from tax benefits to additional benefits for public investment into designated Opportunity Zones. This is also the case for the federal government, where more than 400 federal grants from 20 federal agencies have offered Opportunity Zone benefits, such as preference points giving priority consideration to grants in designated Opportunity Zones or those used in combination with Qualified Opportunity Funds.

Census tracts themselves are somewhat arbitrary in designation. They are meant to be relatively permanent geographic designations that can be analyzed longitudinally. They are generally designated to have a population between 1,200 and 8,000, with 4,000 being the ideal; therefore, census tracts are typically split or combined depending on population changes (U.S. Census Bureau, 2019b). Census tracts tend to follow legal boundaries and other boundaries, such as waterways, railroad tracks, and roads (U.S. Census Bureau, 2018). Although many studies use census tracts as a proxy for neighborhoods because census data are collected and made available at this geographic level, some research has challenged whether tracts truly represent real neighborhoods (Clapp and Wang, 2006; Sperling, 2012). For instance, Clapp and Wang (2006) found that using a classification model to define optimal neighborhoods creates different boundaries—for instance, boundaries that run behind houses rather than down the middle of the street. Sperling (2012) notes that tracts are not necessarily homogenous in settlement patterns or sociodemographic characteristics. These limitations are important to keep in mind when analyzing the effect of the Opportunity Zones incentive on neighborhood communities.

Census tracts vary widely in size and population depending on where they are located across the rural-urban continuum.[3] Exhibit 1 shows that urbanized tracts in major metropolitan areas have the smallest average size (3 square miles) and the largest average population per tract (4,655 people), whereas rural tracts are much larger (268 square miles on average) and comprise smaller populations (3,544 people on average). These characteristics will have implications for housing and economic development strategies and the evaluation of outcomes across designated Opportunity Zones.

[2] "Insular areas" refers to U.S. territories: Puerto Rico, Guam, the Northern Mariana Islands, American Samoa, and the U.S. Virgin Islands. The designated Opportunity Zones in U.S. insular areas offer similar benefits to those on the U.S. mainland and merit further research, but these are largely outside the scope of this article.

[3] To compare census tracts across urban/rural morphologies, the authors divided them into three redefined groups based on census block classifications in the 2010 decennial census (see https://www.census.gov/programs-surveys/geography/about/faq/2010-urban-area-faq.html):

- "Rural" tracts are those with at least 90 percent of their population living in rural census blocks.
- "Small town" tracts are those that were not deemed "rural" and that have more residents in urban cluster blocks than in urbanized area blocks.
- "Urbanized" tracts are those that were not deemed "rural" and that have more residents in urbanized area blocks than in urban cluster blocks.

"Major metro area" means a metropolitan statistical area with a Census-estimated population of more than 3 million in 2019 or a population of more than 1 million with a growth rate of at least 10 percent between 2010 and 2019 (https://www.census.gov/newsroom/press-kits/2020/pop-estimates-county-metro.html).

Exhibit 1

Census Tract Differences across Urban/Rural Morphologies

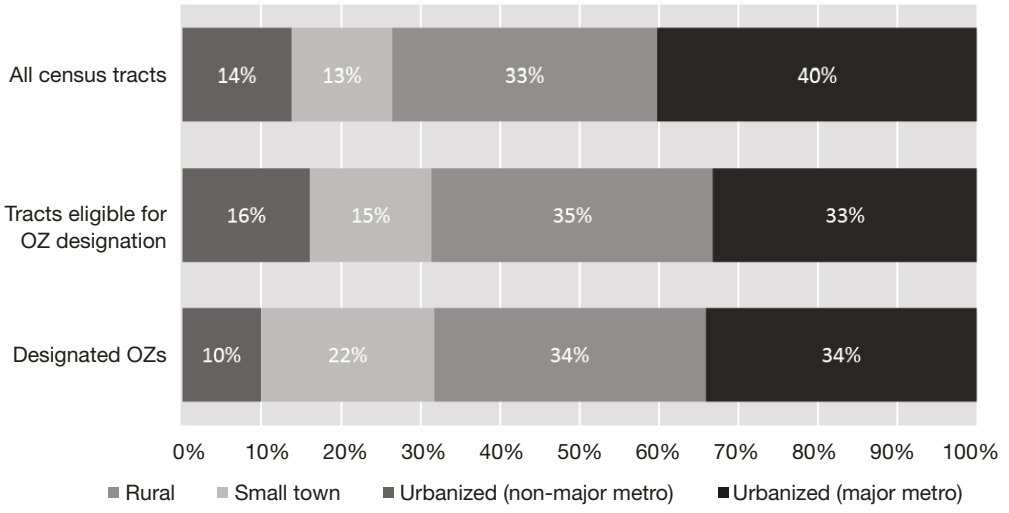
	Rural	Small town	Urbanized (non-major metro area)	Urbanized (major metro area)
Average size (square miles)	268	63	7	3
Population per tract	3,544	4,551	4,395	4,655

Sources: Authors' calculations; U.S. Census Bureau, 2011, 2019a

Examining the distribution of designated Opportunity Zones across rural and urban morphologies is important for understanding how the incentive will play out across the country. Exhibit 2 shows that, among tracts that were eligible for Opportunity Zone designation, a lower proportion of urbanized tracts in major metropolitan areas qualified for Opportunity Zone designation relative to their overall share of all tracts. Among eligible tracts, a disproportionately higher share of small-town tracts and a disproportionately lower share of rural tracts were selected. States may have seen small-town census tracts as more favorable for investment and economic development than rural tracts; local land use and the potential for investment may also have been considered in the recommendations for designation. The distribution of designated Opportunity Zones across urban and rural morphologies shows some of the priorities and strategies states pursued when recommending their Opportunity Zones for designation.

Exhibit 2

Rural/Urban Morphology of Opportunity Zones (OZs)



Sources: Authors' calculations; Community Development Financial Institutions Fund, n.d.

The universe of census tracts eligible for Opportunity Zone designation varied by census region, state, and within various areas within states. New England had the lowest proportion of eligible census tracts (46 percent), and the East South Central division (comprising Alabama, Kentucky, Mississippi, and Tennessee) had the highest (70 percent) (exhibit 3). These discrepancies increased

at the state level; only 38 percent of Hawaii's census tracts were eligible for Opportunity Zone designation, compared to 81 percent of Mississippi's census tracts (exhibit 4). These differences largely reflect disparate poverty rates across states. These baseline disparities across different states and regions of the country mean that there may be inherent differences between the Opportunity Zones selected in each state and within each state.

Exhibit 3

Opportunity Zone Eligibility by Census Region

Census Region (and Division)	Census Tracts	Tracts Eligible for OZ Designation	Percent of all Tracts Eligible for OZ Designation (%)	Designated OZs
NORTHEAST	**13,538**	**6,688**	**49**	**1,302**
New England	3,392	1,572	46	319
Middle Atlantic	10,146	5,116	50	983
SOUTH	**26,308**	**16,494**	**63**	**3,098**
South Atlantic	13,706	8,283	60	1,540
East South Central	4,457	3,124	70	578
West South Central	8,145	5,087	62	980
MIDWEST	**17,093**	**9,311**	**54**	**1,730**
East North Central	11,808	6,385	54	1,211
West North Central	5,285	2,926	55	519
WEST	**16,117**	**8,724**	**54**	**1,696**
Mountain	5,250	2,888	55	542
Pacific	10,867	5,836	54	1,154

OZ = Opportunity Zone.

Sources: Authors' calculations; Community Development Financial Institutions Fund, n.d.

Exhibit 4

Opportunity Zone Eligibility by State, in Ascending Order Based on the Share of Tracts Eligible (1 of 2)

State	Census tracts	Tracts eligible for OZ designation[4]	Percent of all tracts eligible for OZ designation (%)	Designated OZs
Hawaii	351	132	38	25
Rhode Island	244	97	40	25
Alaska	167	68	41	25
North Dakota	205	84	41	25
Connecticut	833	344	41	72
New Jersey	2,010	835	42	169
Wyoming	132	56	42	25
Massachusetts	1,478	677	46	138
Nevada	687	330	48	61
Utah	588	283	48	46
Vermont	184	89	48	25

[4] Census tracts eligible for Opportunity Zone designation include "low-income communities," with a poverty rate of at least 20 percent or a median income 80 percent or less of that of the state or metropolitan statistical area, and tracts contiguous with a low-income community whose median income does not exceed 125 percent of that of the contiguous low-income community.

Exhibit 4

Opportunity Zone Eligibility by State, in Ascending Order Based on the Share of Tracts Eligible (2 of 2)

State	Census tracts	Tracts eligible for OZ designation	Percent of all tracts eligible for OZ designation (%)	Designated OZs
Iowa	825	410	50	62
South Dakota	222	112	50	25
Pennsylvania	3,218	1,640	51	300
New Hampshire	295	151	51	27
Nebraska	532	273	51	44
Wisconsin	1,409	734	52	120
Colorado	1,249	657	53	126
Maryland	1,406	743	53	149
Illinois	3,123	1,659	53	327
Washington	1,458	780	53	139
New York	4,918	2,641	54	514
California	8,057	4,343	54	879
Indiana	1,511	817	54	156
Delaware	218	118	54	25
Michigan	2,813	1,528	54	288
Kansas	770	420	55	74
Florida	4,245	2,356	56	427
Minnesota	1,338	744	56	128
Ohio	2,952	1,647	56	320
Virginia	1,907	1,071	56	212
Arizona	1,526	870	57	168
Texas	5,265	3,131	59	628
Maine	358	214	60	32
Montana	271	162	60	25
Oregon	834	513	62	86
Oklahoma	1,046	651	62	117
Missouri	1,393	883	63	161
North Carolina	2,195	1,414	64	252
Idaho	298	192	64	28
District of Columbia	179	116	65	25
Tennessee	1,497	986	66	176
South Carolina	1,103	741	67	135
New Mexico	499	338	68	63
Georgia	1,969	1,339	68	260
Louisiana	1,148	785	68	150
Kentucky	1,115	768	69	144
Alabama	1,181	835	71	158
Arkansas	686	520	76	85
West Virginia	484	385	80	55
Mississippi	664	535	81	100

OZ = Opportunity Zone.

Source: Authors' calculations; Community Development Financial Institutions Fund, n.d.

State control over recommendations for designation means that there is a great deal of variation across the distributions of Opportunity Zones within each state. For instance, states were not required to ensure that each of their counties had at least one Opportunity Zone, but some states included this criterion in their designation strategy. Exhibit 5 shows the share of counties within each state that include designated Opportunity Zones. States such as Missouri, Mississippi, Georgia, and, to a lesser extent, New Mexico, Arkansas, Minnesota, Pennsylvania, and New York, were not as concerned with county-level equity in OZ designation, whereas other states, including Alabama,[5] Florida,[6] Illinois,[7] Kentucky,[8] Maryland,[9] Michigan,[10] North Carolina,[11] and Washington,[12] aimed to designate at least one Opportunity Zone in every county. These statewide distributions of designated Opportunity Zones reflect states' strategies for their Opportunity Zones and may lead to differing investment and community outcomes.

[5] "There is at least one Opportunity Zone in each of the state's 67 counties." Alabama Department of Economic and Community Affairs, Opportunity Zones Program.

[6] "A total of 427 Qualified Opportunity Zones are designated in Florida and located in every county in the state, stretching from the Panhandle through the Keys... The nomination process in Florida included reviewing over 1,200 recommendations submitted by local governments, regional planning councils, nonprofits, developers, investors and others." Florida Department of Economic Opportunity, Opportunity Zones Program. https://web.archive.org/web/20210430234018/https://floridajobs.org/business-growth-and-partnerships/for-businesses-and-entrepreneurs/business-resource/opportunity-zones.

[7] "Phase 2: Equitable Distribution: In order to ensure a statewide beneficial impact, Governor Rauner used a geographical distribution method:

- Provided each of the 88 counties at least one zone that ranks highest on needs-based index.
- Limited each town/city to no more than 5 zones—outside the City of Chicago."

Illinois Department of Commerce & Economic Opportunity, Opportunity Zones. https://web.archive.org/web/20210521122709/https://www2.illinois.gov/dceo/Pages/OpportunityZones.aspx.

[8] "There's an Opportunity Zone within driving distance of every single Kentuckian in the state." Team Kentucky, Opportunity Zones Workshop—Owensboro. https://www.youtube.com/watch?v=HboscM_uFNE.

[9] "Each of Maryland's 24 jurisdictions has at least one Opportunity Zone designation, and the designations will remain in place for the next 10 years." Opportunity Zone Leadership Task Force (2019), The 2019 Maryland Opportunity Zone Leadership Task Force Report. https://governor.maryland.gov/ltgovernor/wp-content/uploads/sites/2/2019/10/Compressed-OZ-Report-1.pdf.

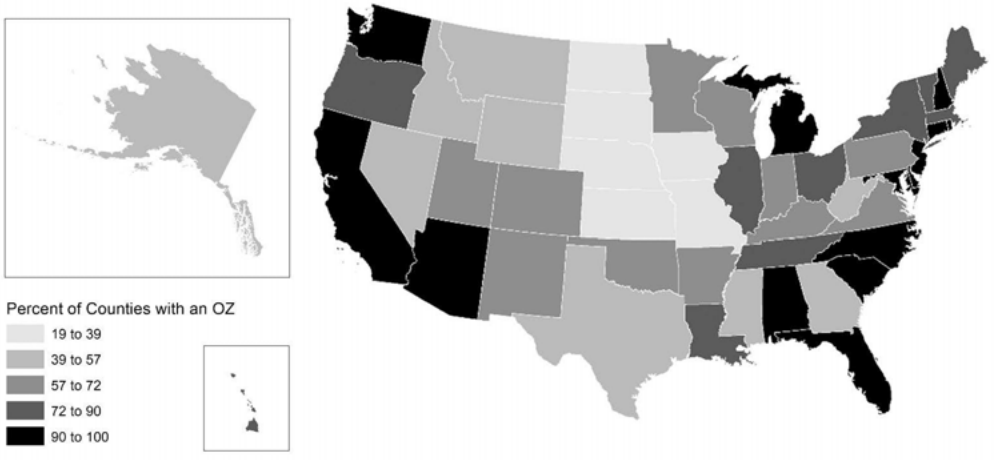
[10] "The first step determined the geographic distribution of the state's 288 Opportunity Zone designations using an area's proportional share of the statewide total of eligible low-income tracts (1,158). If a county had 25 percent of the state's eligible tracts, it was initially given 25 percent of the state's eligible tract designations. Then, designation considerations and any necessary modifications were made to account for original Rising Tide communities and each rural county that had at least one low income census tract." Michigan Opportunity Zones, About. https://web.archive.org/web/20210120120344/https://miopportunityzones.com/about/.

[11] "[T]o select the number of zones called for in the federal law, the state followed these guiding principles... Opportunity for all: Aim for at least one Opportunity Zone in every county." NC Department of Commerce, North Carolina Opportunity Zones. http://web.archive.org/web/20210421023640/https://public.nccommerce.com/oz/#section-zones.

[12] "Opportunity Zone Pools: County/associate development organization (ADO) Set-Aside (up to 69 tracts total): Each county, through the applicable ADO, may nominate a certain number of eligible census tracts within the county for designation. The number of tracts per county is allocated based on the total number of eligible tracts in the county... Counties will receive a minimum of one and a maximum of five tracts through this formula. If fewer than 69 tracts are nominated, any remaining tracts will be added to competitive process.
Federally recognized Tribe Set-Aside (up to 29 tracts total): Each of the state's federally recognized tribes may nominate one eligible census tract for designation. The tract may, but need not, include lands owned or controlled by the nominating tribe. If fewer than 29 tracts are nominated, any remaining tracts will be added to the competitive process." Washington State Department of Commerce, Opportunity Zones, How Did Washington Decide Which Areas to Designate as Opportunity Zones? http://web.archive.org/web/20210310050954/https://www.commerce.wa.gov/growing-the-economy/opportunity-zones/.

Exhibit 5

Distribution of Designated Opportunity Zones Across Counties, by State



OZ = Opportunity Zone.
Map created by the authors using ArcGIS® software by Esri.
Source: U.S. Census Bureau, 2019a

Existing Opportunity Zone Typologies

Several researchers have developed typologies to classify the diversity of Opportunity Zones into subsets of tracts, which are more manageable to understand and analyze for investors, community advocates, evaluators, and other Opportunity Zone stakeholders (exhibit 6). These studies have classified Opportunity Zones on the basis of data around various metrics, such as opportunities and jobs, social vulnerability, socioeconomic change, industrial or commercial uses, or presence of anchor institutions. Some of the Opportunity Zone types identified by these typologies may look more favorable for real estate or business investment than others. Some typologies focus on the organization's perceived benefits that communities prefer—for instance, higher growth or anchor institutions conducive to economic development. Other typologies incorporate strong social equity considerations—for instance, those with high social vulnerability or those experiencing significant socioeconomic change. The variation in the existing typology studies to date illustrates the diversity of the designated Opportunity Zones and the range of views around economic development in underinvested communities. The typology in this article focuses on housing investment outcomes, and it uses a more nuanced methodology to classify Opportunity Zones into different clusters on the basis of variables around housing markets and sociodemographics of existing residents.

Exhibit 6

Existing Opportunity Zone Classifications (1 of 2)

Source	Purpose	Methodology	Inputs	Types
Coes & Loh, 2018	"For investors to identify which Opportunity Zones should be prioritized for investment from a triple-bottom-line perspective that can deliver positive economic, environmental, and social returns. Additionally… to provide local policymakers and community groups with a policy framework to manage and ensure equitable, inclusive development in Opportunity Zones."	Developed one score for each Opportunity Zone's walkable urban form and a second score indicating social vulnerability. Categorized Opportunity Zones by state based on these scores.	*Smart Growth Potential:* Walkability Index (EPA), Job density (LEHD), Distance to top 100 CBD (GIS), Density (ACS) *Social equity and social vulnerability:* Transportation Accessibility (EPA), Housing/Transportation Affordability Index (developed by Center for Neighborhood Technology from ACS), housing tenure (ACS), Social Vulnerability Index (CDC), Environmental Justice Index (EPA)	• High opportunity and low equity • High equity and low opportunity • Low equity and low opportunity • Bubble communities / emerging WalkUPs
Katz, 2018	"Guide the market and spur financial institutions, local economic development organizations, and other intermediaries to do the kind of deeper data collection and analysis that matches capital to investable projects."	Used jobs-to-residents ratio to categorize Opportunity Zones into four types. Anchor tracts have hospitals with 300+ beds and/or colleges with 5,000+ students. Industrial tracts have at least a 20-percent share of construction, manufacturing, transportation, or warehouse jobs.	Jobs-to-residents ratio (LEHD), national data set of hospitals and colleges, occupational industries	• Tier 1 job centers • Tier 2 job centers • Mixed jobs/ residential • Residential areas • Anchor tracts • Industrial tracts
Higgins & Katz, 2019	"By placing Opportunity Zones into employment centers with recognizable districts… we hope to have made patterns more visible to investors seeking new deals, public officials seeking model policies to ensure equitable community growth, and the civic sector seeking ways to influence the market."	Focused on 429 most job-dense Opportunity Zones (top 5 percent or >3:1 job:res ratio), which act as employment centers and have some market traction, giving them the highest potential for inclusive growth	Jobs (total, by industry, age, race) (LEHD), 5-year job change (LEHD), population (ACS), median household income (ACS), neighborhood characteristics (Zillow), locations of hospitals, airports, large universities (NCES)	• Downtown • Anchor district (education or medical) • Industrial district • Airport or port district • Non-CBD district

Exhibit 6

Existing Opportunity Zone Classifications (2 of 2)

Source	Purpose	Methodology	Inputs	Types
Develop LLC, n.d.	"Provide a tool for wealth managers, fund managers, real estate developers, business investors, and other stakeholders to gain a much deeper understanding of where there is 'opportunity' in communities they may have never seriously explored before."	Created Opportunity Zones Index from average ranking of each Opportunity Zone on six equally weighted indicators	Projections developed by Esri Demographics based on ACS: 2018–2023 population growth rate, 2018 total retail sales, 2023 median household income, 2023 median home value, 2018 bachelor's degree rate, 2018 unemployment rate	Percentile ranks
Theodos et al., n.d.	"Given the breadth of eligible investment types, Opportunity Zones must be carefully selected to ensure the return on the public investment is maximized and will lead to gains for low- and moderate-income residents. To guide selection, we prepared a data set for all eligible tracts, ranking them in terms of the investment flows they are already receiving and the social and economic change they have experienced."	Developed investment score to capture existing equity flows in tract. Also developed flag for socioeconomic change to indicate places where gentrification is potentially occurring.	*Investment score:* Loan dollar amounts to multifamily and commercial businesses (CoreLogic, Inc.), loan dollar amounts to homeowners (HMDA), loan dollar amounts to small businesses (CRA), number of employees (LEHD), SF and MF housing units (ACS) *Socioeconomic change flag:* Change in residents with college degree, median family income, share of white population, housing cost burden (ACS, Census Bureau)	Deciles of investment scores; Socioeconomic change flag

ACS = American Community Survey. CBD = central business district. CDC = Centers for Disease Control and Prevention. CRA = Community Reinvestment Act. EPA = Environmental Protection Agency. GIS = geographic information system. HMDA = Home Mortgage Disclosure Act. LEHD = Longitudinal Employer-Household Dynamics. MF = multifamily. NCES = National Center for Education Statistics. SF = single-family.

Existing Neighborhood Typologies and Housing Typologies

To guide the development of this Opportunity Zone typology, the authors also looked to the literature on typologies of neighborhoods (as identified by census tracts) or other housing typologies. Exhibit 7 displays a table comparing the universes, variables used, and resulting types identified by a sample of studies. To develop their typologies, the authors of most studies used a relatively large number of variables, which captured demographics (such as race, immigration status, age, income, poverty, and family structure), housing markets (such as tenure, housing types, age of stock, housing values, vacancy rates, and housing quality), neighborhood form (such

as population density, building types, and urban/rural morphology), local economics (such as employment and establishments), or a combination of these variables. Typologies identified 4 to 10 types of neighborhoods—or countries, in the case of André and Chalaux (2018). Others created standardized indices around access to opportunity and ranked neighborhoods relative to each other (for example, the Mastercard Center for Inclusive Growth or Enterprise Community Partners). Major themes covered by the typologies include race and immigration, affluence (struggling versus prosperous areas), change or growth, diversity, and urban/rural morphology. The authors drew from these variables and themes when developing their typology of Opportunity Zones.

Exhibit 7

Selected Housing and Neighborhood Typologies from the Literature (1 of 3)

Source	Universe	Variables used to delineate types	Types
Economic Innovation Group (2020), Distressed Communities Index	ZIP Codes, counties, cities, or congressional districts	High school diploma rate, poverty rate, share of population age 25–54 not working (unemployed or not in labor force), vacancy rate, median household income, 2014 to 2018 change in employment, 2014 to 2018 change in establishments	• Prosperous • Comfortable • Mid-tier • At risk • Distressed
Mastercard Center for Inclusive Growth (2021)	Census tracts[13]	Inclusion and growth metrics: Place (growth in net occupancy, growth in residential real estate value, share parkland, share without housing burden, internet subscription rate, share with commute < 35 min), Economy (growth in net new businesses, growth in spending, growth in small business loans, share minority or women-owned businesses, labor market engagement index, share business types represented), Community (growth per capita income, growth per capita spending, Gini coefficient, early education enrollment, share females living above poverty, health insurance coverage)	Percentile ranks of Inclusive Growth Score
Enterprise Community Partners Opportunity360 (n.d.)	All census tracts	*Housing stability* (homeownership rate, share receiving project-based housing assistance, share receiving HCVs, share low-income households severely cost burdened, share occupied units that are crowded, share households with multiple families), *Education* (share with HS diploma, associate's degree, bachelor's degree), *Health and well-being* (share uninsured, life expectancy), *Economic security* (median household income, HUD Labor Market Engagement Index Score, poverty rate, unemployment rate), *Mobility* (share commuting with transit, share commuting by walking, average travel time to work, share commuting more than an hour, share with no vehicle)	Percentile ranks of Opportunity360 index

[13] Census tracts were categorized in comparison with census tracts across the country, within the same state, or with the same level of urbanization as measured by the U.S. Department of Agriculture Urban-Rural Continuum.

Exhibit 7

Selected Housing and Neighborhood Typologies from the Literature (2 of 3)

Source	Universe	Variables used to delineate types	Types
Spielman and Singleton (2015)	All census tracts	Age, race, education, family structure, language, mobility/stability, housing type, housing price, vacancy, housing age, density, commuting, industry, wealth, public assistance	• Hispanic and children • Wealthy nuclear families • Middle income, single-family homes • Native American • Wealthy urbanites • Low income and diverse • Old wealthy White • Low-income minority mix • African-American adversity • Residential institutions, young people
Bieri, Knox, and Wei (2012)	Suburban areas[14]	White, married with children, foreign born, educational attainment, older than 65, homeownership rate, percent detached single-family, family income	• Sitcom suburbs • Elite suburbs • Affluent suburbs • Renter/condos • Mixed income • Immigrant/minority
Vicino, Hanlon, and Short (2011)	Immigrant neighborhoods[15]	Income, education, race and ethnicity, household family structure, age of housing	• Asian • Gentrified • White working class • Hispanic
Owens (2012)	Socioeconomically ascending neighborhoods	Race, foreign born, population, households, housing built within past 10 years; residents under 8, under 5, and over 65; female-headed households, poverty rate	• Minority urban • Affluent • Diverse urban • New White • Upper-middle-class White • Booming • Hispanic enclave • No population
Fisher and Woodwell (2017)	Neighborhood housing markets (census tracts)	Urban/suburban/rural or exurban (quartiles of households per square mile density or outside MSA); multifamily density (25% households in 50+ unit buildings, tertiles of percent multifamily)	• Apartment towers • High-density downtown neighborhoods • Apartment suburbs • Eclectic urban • Eclectic suburban • City neighborhoods • Suburban communities • Off the beaten path • Exurban areas • Rural

[14] Suburban areas were defined as tracts in metro areas not in central cities.

[15] Immigrant neighborhoods were defined as census tracts from 18 Consolidated Metropolitan Statistical Areas (CMSAs) with their center inside the central city, with a location quotient over 1.25 for foreign-born population share (for the tract compared with the CMSA's urban tracts).

Exhibit 7

Selected Housing and Neighborhood Typologies from the Literature (3 of 3)

Source	Universe	Variables used to delineate types	Types
Metropolitan Council (Twin Cities) (2020)	Changing suburban neighborhoods in seven counties	Race, age, income, housing costs, percent of housing built in past 10–15 years	• Type A: renter communities of color with high poverty • Type B: older inner-ring suburbs with slow housing recovery • Type C: historically White, working class areas with strong, affordable housing stock • Type D: fastest recovering immigrant hubs • Type E: Transit-oriented development (TOD)-friendly senior hubs • Type F: exurban areas with strong growth and development • Type G: affluent exurban areas near natural amenities
Mikelbank (2004)	Suburban tracts	Population (size, education, age, income, race, family structure), housing stock (value, rent, age, vacancy), economy (employment, establishments, taxes)	• Seasonal wealth White bedrooms • Traditional White bedrooms • Small retail White bedrooms • Black manufacturing • Struggling manufacturing • Suburban success: prosperity • Suburban success: working stability • Suburban success: aging • South/western working diversity • Central working diversity
André and Chalaux (2018)	32 countries	Tenure, cost burden, overcrowding, dwellings per thousand inhabitants, distribution in urban vs. rural areas, vacant homes and residential construction, prices, rents, price-to-income ratio index, distribution of tenures, affordability, debt-to-income ratios, housing quality (amenities, living space, deprivation), homelessness, policy measures and national schemes, types of support, housing allowance eligibility criteria and payment rates, social housing stock and new construction, agencies and governance of social housing sector	• Northern (extended private rental, high household debt) • Western (higher homeownership rates, more social housing) • Southern-Central (overcrowding, limited social housing) • Eastern (prevalent homeownership, poorer housing conditions)

HCV = Housing Choice Voucher. HS = high school. HUD = Department of Housing and Urban Development. MSA = metropolitan statistical area.

Methods

To discern how the Opportunity Zone incentive may play out differently across the various designated census tracts, the authors developed an Opportunity Zone typology separating the designated tracts into distinct groups. Following the likes of Spielman and Singleton (2015); Bieri, Knox, and Wei (2012); and Vicino, Hanlon, and Short (2011), the authors used a standard approach for developing a typology, first conducting a principal components analysis (PCA) as a means of feature selection, based on a set of 40 variables related to demographics and housing markets, followed by a cluster analysis inputting the principal components that explained most of the variation among the designated Opportunity Zones. This approach identified five distinct clusters of Opportunity Zones.

These methods were applied to 7,791 of the 8,764 designated Opportunity Zones. As noted previously, the 938 Opportunity Zones in Puerto Rico, Guam, the Northern Mariana Islands, American Samoa, and the U.S. Virgin Islands were not included in this analysis because of data limitations and fundamental differences in the investment context between designated Opportunity Zones in U.S. states and those in U.S. insular areas. An additional 35 Opportunity Zones in the 50 states and the District of Columbia were also not included in the cluster analysis because they contain very few resident households and housing units and are therefore not appropriate to include in a cluster analysis based on demographic and housing market attributes.[16]

Most of the 40 variables come from estimates produced by the U.S. Census Bureau's 2019 5-year American Community Survey (2019 ACS), but data on jobs from the U.S. Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) and housing prices from the Federal Housing Finance Agency and HUD were also used.[17] Variables were chosen that have good coverage across the Opportunity Zones in this analysis.

Using PCA, these 40 standardized variables were transformed into a smaller set of principal components (PCs), which limits the variables' collinearity and identifies the variables that capture most of the variance among the Opportunity Zones, as represented by the original 40 variables. The PCA was executed using R software on a data matrix containing the standardized scores of the 40 variables for the 7,495 Opportunity Zones with valid data for all variables. Ten principal components were obtained, which together explain 73 percent of the variance across the 40 variables.[18]

[16] These 35 Opportunity Zones were excluded because they contain fewer than 100 households, according to the U.S. Census Bureau's 2019 American Community Survey 5-year estimates. See table in appendix exhibit 1 for a summary of them.

[17] See the Data Sources appendix exhibit 2 for more details and source information on the 40 variables.

[18] *Principal components* are linear transformations of a set of input variables, and PCs are orthogonal to previous PCs, such that each additional PC captures a different portion of the variance of the observations along all variables. The PCA identified 10 principal components with eigenvalues (measuring the magnitude of the variance captured by the PC) greater than 1. Dropping principal components with an eigenvalue of 1 or less follows the Kaiser rule. An eigenvalue of 1 is equivalent to the variance explained by an average single variable. For full factor loadings of each PC, see appendix exhibit 3.

Next, the Zones were grouped into five clusters of similar Opportunity Zones by running a k-means clustering algorithm on the 10 principal components.[19] Because the k-means algorithm begins with a random selection of cluster centers at the beginning of the optimization process, it yields slightly different results each time it runs. The algorithm was run 100 times, and the results with the best fit, as measured by the variability of the observations within each cluster, were chosen. From the resulting grouping of the 7,495 complete-data Opportunity Zones, the means of the 40 original variables were calculated for each of the five clusters. The remaining 296 Opportunity Zones that were missing at least one variable were assigned to the five clusters by selecting the nearest cluster based on the Euclidean distance between the non-missing variables and each cluster mean.

With each Opportunity Zone assigned to one of five clusters, the authors qualitatively characterized each cluster by examining (a) the distribution of the 40 demographic and housing variables by cluster and (b) the geographic location of each cluster's Opportunity Zones.

Results

Exhibit 8 displays the characteristics of the five clusters of Opportunity Zones identified by the algorithm. The clusters are not equal in size; the smallest cluster, Cluster 2, includes 490 Opportunity Zones, and the largest cluster, Cluster 3, includes 2,771 Opportunity Zones. Exhibit 9 covers the most significant characteristics of each cluster based on the deviation of the cluster mean from the overall mean among all Opportunity Zones.

Cluster 1, which constitutes 26 percent of all Opportunity Zones, has the highest Black population of all clusters, the highest poverty rate, the highest unemployment rate, and the lowest median income (both in absolute terms and relative to the median income of the area[20]). Cluster 1 also has the oldest owner-occupied housing and has among the oldest renter-occupied housing of all clusters, both of which date back to the 1960s, on average (exhibit 10).

Cluster 2, constituting just 6 percent of all Opportunity Zones, is the most urbanized cluster, with the lowest homeownership rate, rate of commuting by driving alone, and share of households living in detached single-family homes, and the highest population density, job density, and share of households living in multifamily buildings. Cluster 2 also has the oldest renter-occupied housing, the highest housing prices (for home values and rents), and high shares of foreign-born and Asian populations.

[19] Five clusters were identified by choosing an "elbow" of the plot of within-cluster variability and number of clusters chosen. The choice of five clusters is in line with other typologies of census tracts or housing markets and other Opportunity Zone classifications, if on the lower end. Because Opportunity Zones already represent a particular subset of distressed census tracts, it makes sense to classify them into fewer categories.

[20] The *area* refers to the CBSA (metropolitan statistical area or micropolitan statistical area) or county if the Opportunity Zone is not located in a CBSA. CBSAs (core-based statistical areas) are defined by the Office of Management and Budget and consist of one or more counties all economically tied to an urban center of at least 10,000 people. CBSAs include the 384 metropolitan statistical areas (MSAs) and 543 micropolitan statistical areas. This cluster analysis uses CBSA-level variables to represent regional area conditions. If the Opportunity Zone is not in a CBSA, county-level variables are used.

Cluster 3 constitutes 36 percent of all Opportunity Zones and includes almost all rural tracts, with a population density of 822 people per square mile on average. Cluster 3 has the largest share of White non-Hispanic populations (70 percent on average, which is still lower than the U.S. share of non-Hispanic Whites—76 percent, according to the 2019 ACS 1-year estimates) and highest homeownership rates, as well as the lowest rents and lowest rates of HUD assistance and FHA-insured mortgages (exhibit 10). Although more than 97 percent of Opportunity Zones in the other clusters are inside metropolitan statistical areas (MSAs), only 40 percent of Cluster 3 Opportunity Zones are in MSAs (29 percent are in micropolitan statistical areas, and 31 percent are outside Core-Based Statistical Areas [CBSAs]).

Cluster 4 constitutes 13 percent of all Opportunity Zones, and its demographics include smaller households, more college graduates, fewer families with children, and a higher share of recent movers.

Finally, Cluster 5 constitutes 19 percent of all Opportunity Zones and consists of majority-Hispanic populations; a high share of foreign-born, larger households; and the highest share of families with children (43 percent). Cluster 5 tracts are located in areas with high and rising home prices and have the highest rate of FHA-insured mortgages (18 percent of owner-occupied homes have FHA-insured mortgages).

Exhibit 8

Opportunity Zone Clusters: Variable Means (1 of 2)

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Number of Opportunity Zones	2,047	490	2,771	982	1,501
Percent of Opportunity Zones	26%	6%	36%	13%	19%
Tract urban form variables					
Population per square mile	4,981	42,369	822	5,078	8,103
Population plus jobs per square mile	7,306	59,621	1,281	13,181	10,486
Percent urban area	92%	100%	19%	94%	93%
Percent urban cluster	6%	0%	40%	5%	4%
Percent rural area	1%	0%	41%	1%	2%
Jobs-to-resident ratio	0.79	0.89	0.51	2.29	0.51
Percent who drive alone to work	67%	29%	80%	68%	71%
Percent who take public transit, walk, or bike to work	16%	60%	4%	17%	9%
Tract housing variables					
Percent living in the same home as a year ago	81%	87%	86%	72%	87%
Percent vacant	20%	9%	17%	13%	8%
Percent of housing stock that is single-family detached	46%	7%	67%	29%	48%
Percent of housing stock in buildings with 20+ units	11%	45%	3%	27%	10%
Median gross rent	$757	$1,340	$740	$993	$1,126
Median home value	$94,607	$611,016	$119,809	$227,762	$241,829
Number of units built in 2014 or later	14	47	31	84	28
Percent who own home	36%	20%	65%	31%	42%

Exhibit 8

Opportunity Zone Clusters: Variable Means (2 of 2)

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Tract demographic variables					
Gini coefficient	0.48	0.49	0.44	0.48	0.42
Poverty rate	37%	24%	20%	25%	24%
Median household income	$27,944	$51,373	$43,977	$45,145	$46,542
Percent of population 25 or older with a college degree	12.7	31.2	17.2	37.0	13.9
Household size	2.49	2.64	2.48	2.11	3.32
Percent of households that are families with children under 18	30%	29%	29%	19%	43%
Percent of population 65 or older	13%	12%	19%	12%	10%
Percent of population that is foreign born	8%	38%	5%	12%	31%
Percent unemployed	14%	7%	7%	6%	8%
Percent not in labor force	45%	36%	44%	34%	36%
Percent White Non-Hispanic	25%	21%	70%	56%	19%
Percent Black	59%	30%	14%	23%	18%
Percent Hispanic	14%	36%	11%	14%	57%
Percent Asian	1%	14%	1%	5%	5%
Tract temporal variables					
Absolute change in households from 2013 to 2019	6	122	10	161	85
Percent change in household income from 2013 to 2019	17%	30%	19%	34%	26%
Percent change in rent from 2013 to 2019	12%	25%	13%	22%	19%
Percentage point change in population with a college degree, 2013 to 2019	2	6	2	7	2
CBSA/county housing variables[21]					
Median home value, CBSA or county	$188,314	$510,908	$149,804	$244,910	$374,207
HUD Fair Market Rent	$1,039	$2,032	$865	$1,182	$1,535
CBSA/county temporal housing variable					
CBSA/non-CBSA state home price index (2020 with 2012 base year)	137	140	133	147	165
Tract relationship to area variables					
Ratio of median household income of tract to CBSA (or county if non-CBSA)	0.47	0.62	0.87	0.69	0.66
Ratio of median gross rent of tract to CBSA/county	0.80	0.89	0.94	0.94	0.87
Ratio of median home value of tract to CBSA/county	0.50	1.24	0.83	0.97	0.64

CBSA = core-based statistical area.

Source: Authors' analysis. See appendix exhibit 2 for more details and source information on the 40 input variables.

[21] CBSAs (core-based statistical areas) are defined by the Office of Management and Budget and consist of one or more counties all economically tied to an urban center of at least 10,000 people. CBSAs include the 384 metropolitan statistical areas (MSAs) and 543 micropolitan statistical areas. In this cluster analysis, CBSA-level variables were used to represent regional area conditions. If the Opportunity Zone is not in a CBSA, county-level variables were used.

Exhibit 9

Significant Characteristics of Opportunity Zone Clusters

Cluster	Percent of all OZs (%)	Most Significant Characteristics of Each Cluster, Based on Deviation of Cluster Mean from Overall Mean		Name
1	26	Much higher (relative to all OZs)	Black population, poverty rate, unemployment rate	Underinvested majority-Black communities
		Much lower (relative to all OZs)	Median income (absolute and relative to regional median income)	
2	6	Much higher	Median home value (absolute and relative to regional median income), commuting by transit, population and job density, HUD Fair Market Rent, regional median home value, people living in large multifamily buildings, foreign-born population, Asian population, median rent, people with college degrees	Metropolitan immigrant communities
		Much lower	Ownership rate, people living in detached houses, commuting by driving alone	
3	35	Much higher	Ownership rate, White non-Hispanic population, people living in a rural area	Rural, small town, and tribal communities
		Much lower	People living in an urbanized area	
4	13	Much higher	People with college degrees	Growing job hubs
		Much lower	Household size, families with children, people living in the same place as 1 year ago	
5	19	Much higher	Hispanic population, household size, foreign-born population, families with children, regional median home value, regional home price growth, HUD Fair Market Rent	Suburban majority Hispanic families
		Much lower	NA[22]	

NA = not applicable. OZ = Opportunity Zone.

Source: Authors' analysis. See appendix exhibit 2 for more details and source information on the 40 input variables.

[22] None of the variables' means for cluster 5 were significantly lower than its mean for all clusters. Variables with cluster means over 0.8 standard deviations from the overall mean were considered significant cluster characteristics.

Exhibit 10

Opportunity Zone Clusters: Age of Housing and Housing Assistance[23]

Cluster	Median year built	Median year built (owner-occupied)	Median year built (renter-occupied)	Percent of renter households with HUD assistance (%)	Percent of owner-occupied households with FHA-insured mortgage (%)
1	1964	1962	1966	20	15
2	1964	1972	1965	20	11
3	1974	1974	1974	5	8
4	1974	1974	1976	11	10
5	1971	1969	1973	8	18

FHA = Federal Housing Administration.

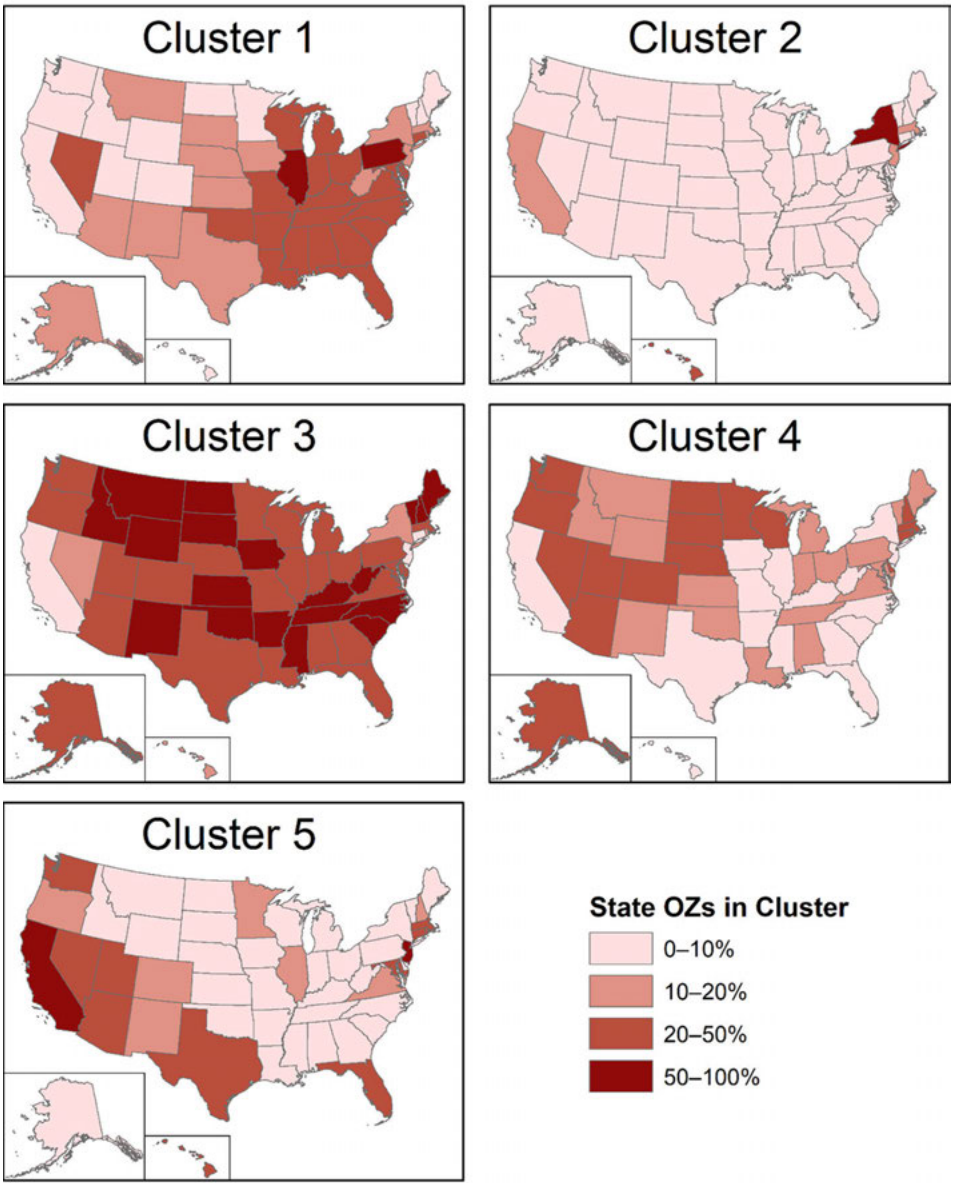
Sources: Authors' calculations; HUD administrative data; U.S. Census Bureau, 2020

Examining the distribution of Opportunity Zone clusters across states (exhibits 11 and 12) shows regional correlations between cluster types and certain areas of the country. Cluster 2 ("metropolitan immigrant communities") is almost absent from the South and Midwest and is most prevalent in New York (where it makes up 59 percent of Opportunity Zones), Hawaii (36 percent), and Washington, D.C. (24 percent). This finding makes sense because Cluster 2 represents the densest and most urbanized tracts, which can be found in these states. Cluster 1 ("underinvested majority-Black communities"), which includes largely Black tracts, is concentrated in the South and the East North Central division of the Midwest, and it constitutes the highest share of Opportunity Zones in Illinois (where it makes up 63 percent of all Opportunity Zones), Washington, D.C. (56 percent), and Pennsylvania (54 percent). The high share of Cluster 1 in Pennsylvania is significant because Pennsylvania has a below-average share of Black residents (12.9 percent, compared with the U.S. share of 14.2 percent, according to the 2019 ACS 1-year estimates).

[23] The variables shown in exhibit 10 were not used in the cluster analysis because the data coverage was incomplete across Opportunity Zones.

Exhibit 11

Concentration of Opportunity Zone Clusters by State



OZs = Opportunity Zones.
Note: Map created by the authors using ArcGIS® software by Esri.
Source: U.S. Census Bureau

Exhibit 12

Distribution of Opportunity Zone Clusters by State (1 of 2)

State	Tracts eligible for OZ	Percent of all tracts eligible (%)	Desig-nated OZs	Share of OZs, Cluster 1 (%)	Share of OZs, Cluster 2 (%)	Share of OZs, Cluster 3 (%)	Share of OZs, Cluster 4 (%)	Share of OZs, Cluster 5 (%)
Alabama	835	71	158	42	-	47	10	-
Alaska	68	41	25	16	-	48	28	8
Arizona	870	57	168	15	-	26	23	35
Arkansas	520	76	85	27	-	61	6	6
California	4,343	54	879	5	12	6	5	71
Colorado	657	53	126	6	-	47	29	18
Connecticut	344	41	72	43	1	7	21	28
Delaware	118	54	25	32	-	28	32	8
District of Columbia	116	65	25	56	24	-	16	-
Florida	2,356	56	427	36	-	26	8	30
Georgia	1,339	68	260	48	-	41	7	5
Hawaii	132	38	25	4	36	16	8	36
Idaho	192	64	28	4	-	79	11	7
Illinois	1,659	53	327	63	1	22	4	10
Indiana	817	54	156	33	-	44	20	3
Iowa	410	50	62	18	-	73	10	-
Kansas	420	55	74	18	-	62	15	4
Kentucky	768	69	144	21	-	73	6	-
Louisiana	785	68	150	49	-	40	11	1
Maine	214	60	32	3	-	81	16	-
Maryland	743	53	149	32	1	21	18	27
Massachusetts	677	46	138	12	16	20	28	23
Michigan	1,528	54	288	36	-	42	17	3
Minnesota	744	56	128	6	-	50	28	16
Mississippi	535	81	100	21	-	72	6	1
Missouri	883	63	161	44	-	47	9	-
Montana	162	60	25	12	-	72	16	-
Nebraska	273	51	44	14	-	39	39	9
Nevada	330	48	61	30	-	11	25	34
New Hampshire	151	51	27	-	-	59	30	11
New Jersey	835	42	169	18	11	9	8	54
New Mexico	338	68	63	11	-	59	19	11
New York	2,641	54	514	15	59	15	6	5
North Carolina	1,414	64	252	29	-	57	9	5
North Dakota	84	41	25	4	-	64	32	-
Ohio	1,647	56	320	49	-	34	15	1
Oklahoma	651	62	117	22	-	59	14	2
Oregon	513	62	86	1	2	43	40	14

Exhibit 12

Distribution of Opportunity Zone Clusters by State (2 of 2)

State	Tracts eligible for OZ	Percent of all tracts eligible (%)	Desig-nated OZs	Share of OZs, Cluster 1 (%)	Share of OZs, Cluster 2 (%)	Share of OZs, Cluster 3 (%)	Share of OZs, Cluster 4 (%)	Share of OZs, Cluster 5 (%)
Pennsylvania	1,640	51	300	54	2	26	14	4
Rhode Island	97	40	25	20	-	20	32	28
South Carolina	741	67	135	35	-	58	6	1
South Dakota	112	50	25	12	-	64	24	-
Tennessee	986	66	176	34	-	51	14	1
Texas	3,131	59	628	18	-	46	8	27
Utah	283	48	46	4	-	33	24	39
Vermont	89	48	25	-	-	80	16	4
Virginia	1,071	56	212	22	2	42	19	15
Washington	780	53	139	4	4	43	22	26
West Virginia	385	80	55	18	-	75	7	-
Wisconsin	734	52	120	29	-	36	29	6
Wyoming	56	42	25	4	-	76	16	4

OZs = Opportunity Zones.

Note: A dash indicates that a cluster is not represented in that state.

Source: Authors' analysis. See appendix exhibit 2 for more details and source information on the 40 input variables.

Cluster 3 ("rural, small town, and tribal communities") is the predominant cluster type in states such as Maine (81 percent), Idaho (79 percent), West Virginia (75 percent), Kentucky (73 percent), and Mississippi (72 percent). The low share of Cluster 3 Opportunity Zones in California is striking because California is such a large state and includes rural and suburban tracts, but this classification may be a result of the diverse demographics of California, where only 36.3 percent of the population is non-Hispanic White (according to the 2019 ACS 1-year estimates). Indeed, 71 percent of California's Opportunity Zones are classified under Cluster 5, the predominantly Hispanic cluster. Cluster 3 also contains 77 percent of Opportunity Zones that are in Indian reservations.

Cluster 4 ("growing job hubs") is most represented among Opportunity Zones in Oregon (where 40 percent of Opportunity Zones are Cluster 4), Nebraska (39 percent), North Dakota (32 percent), Delaware (32 percent), and Rhode Island (32 percent) and least represented among Opportunity Zones in states with major cities, such as Illinois (4 percent), California (5 percent), and New York (6 percent), as well as in more rural states, such as South Carolina (6 percent), Arkansas (6 percent), and West Virginia (7 percent). This finding is interesting because much of the discourse around the potential outcomes of Opportunity Zone transactions in gentrifying neighborhoods discusses investments in places such as New York and Los Angeles; however, the Opportunity Zones most likely to be gentrifying (growing with new, early-career college graduates) make up a small share of the Opportunity Zones in states such as New York and California. Nine percent of Cluster 4 Opportunity Zones have universities, and 9 percent have large hospitals, the highest rate of university and hospital coverage among all populated Opportunity Zones.

Cluster 5 ("suburban majority-Hispanic families") is most common in states with large Hispanic populations, including California (71 percent of Opportunity Zones are Cluster 5), New Jersey (54 percent), Utah (39 percent), Hawaii (36 percent), Arizona (35 percent), Nevada (34 percent), and Florida (30 percent). After Cluster 2, Cluster 5 is the least represented among states; 10 states have no Cluster 5 Opportunity Zones.[24]

Appendix exhibit 4 is a set of maps showing specific locations of different Opportunity Zone cluster types in several example areas.[25]

Discussion

Now understanding the characteristics of the five Opportunity Zone clusters and their geographic distribution across the country, the Opportunity Zone investment implications for each cluster and the communities affected by these investments are discussed. Also discussed are considerations for evaluating the Opportunity Zone incentive within the context of each cluster.

Cluster 1 represents majority-Black tracts that have likely seen the greatest underinvestment. Cluster 1 Opportunity Zones have seen the lowest amount of housing built since the 2007–2009 financial crisis and have the highest housing vacancy rate, highest poverty rate, and lowest incomes of all clusters. How would market investors view Cluster 1 Opportunity Zones? Cluster 1 Opportunity Zones may not be prioritized for housing investments due to the high rate of existing vacancies. These tracts may have a need instead for broader economic development investments focused on the creation of new businesses or the relocation of existing businesses into these clusters to create more jobs and higher wages for residents, paired with public investments and alignments of public services, for a more holistic community wealth-building and economic development approach. At the same time, Cluster 1 communities have the most to gain from Opportunity Zone investment; good-quality housing could serve as a social support, and the greatest gains may come from combined housing and business investments, which together boost demand for living and working in these areas. Cluster 1 Opportunity Zones might also benefit from strategic place-making leveraging communities' cultural assets. To evaluate outcomes in Cluster 1 Opportunity Zones, it will be essential to examine changes in housing quality, increases in new construction or rehabilitation, and the rental income characteristics of new developments (market-rate versus income-limited housing). Although there is a lower likelihood of gentrification and forced displacement due to the high existing vacancy rates, these communities are still at risk for displacement if rapid investment occurs without a coordinated approach for affordable housing to ensure that existing residents have options to continue to live in the community if their incomes do not rise parallel to the broader community changes. Community outcomes may need to be measured in the longer term due to higher baseline distress.

Cluster 2 includes the most metropolitan Opportunity Zones, inhabited by more newly arrived and more affluent immigrants and people of color. Cluster 2 has seen the highest rent increases between 2013 and 2019, and the median home values exceed those of the metro area. How

[24] Alabama, Iowa, Kentucky, Maine, Missouri, Montana, North Dakota, South Dakota, Washington, D.C., and West Virginia

[25] The maps and additional examples are also available here: https://bit.ly/3JBECeF. Data and code used for this article are available by request.

would market investors view Cluster 2 Opportunity Zones? Cluster 2 Opportunity Zones would accommodate primarily infill and mixed-use development and substantial rehabilitation or adaptive reuse of existing real estate developments. These clusters are also likely to have more mixed-use and mixed-income housing developments to accommodate the broader economic composition of the neighborhoods. Investors may see higher returns due to the low vacancy rates and positive growth over the past decade. Although these neighborhoods may have seen broader investments in the community, they are also seeing wider disparities in incomes and the types of housing supplied (higher-rent market-rate housing on one end of the spectrum and affordable housing on the other). These neighborhoods could greatly benefit from more workforce housing opportunities, which would provide investors with returns higher than those for income-limited housing while still addressing community needs. Outcomes from Opportunity Zone investments would affect majority-renter, people of color, and immigrant populations. Any lowering of rents from an increasing housing supply or development of more options for housing (affordable housing or workforce housing) could benefit renters. The growing population means that it will be necessary to delineate between outcomes for existing residents and outcomes for new residents (especially if new residents look socioeconomically different from those there previously) while also examining economic mobility within the census tract.

Cluster 3 consists of rural and small-town tracts and tribal communities. Cluster 3 Opportunity Zones are census tracts with majority-white, older owner households that have the second highest vacancy rates and are closest to the incomes and rents of the surrounding area. In terms of housing investments, investors may need to think outside the box; the Opportunity Zone incentive may encourage more innovative rural housing investments beyond typical single-family detached homes, and they may be combined with business relocations and expansions. In terms of community outcomes, housing quality may be more important than housing quantity. Outcomes would affect older and retired residents, who may have particular housing needs around aging. Tribal communities have different baseline situations and would see different potential investment and community outcomes. When evaluating Opportunity Zone outcomes in Cluster 3 census tracts, it will be important to contextualize rural development because it differs from urban or suburban development outcomes. Because Cluster 3 Opportunity Zones are representative of their surrounding counties or CBSAs, it will be important to investigate whether the mere designation of a census tract as an Opportunity Zone encourages the transfers of development that would have initially been targeted to another census tract in the area. Finally, Cluster 3 Opportunity Zones may be affected by more recent short-term changes due to the COVID-19 pandemic because some areas have seen an urban-to-rural migration (Whitaker, 2021). It will be important to examine how much newly built housing is occupied by newcomers moving from more urban areas, and to observe their socioeconomic characteristics compared with those of existing residents.

Cluster 4 Opportunity Zones include the growing urban and suburban tracts inhabited by more educated residents living in job hubs. Cluster 4 census tracts have the smallest households and fewest children and have seen the most gentrification, as defined by growth in college-educated populations; the most housing built since the 2007–2009 financial crisis; and the greatest share of movers new to the census tract. Cluster 4 has the highest job-to-resident ratio (2.3 on average) and the highest proportion of hospitals and universities among populated tracts, and it has rents

close to the median rents of the surrounding area. Investors following market trends in Cluster 4 tracts would be enticed to build housing targeted to recent graduates, early-career professionals, or young families, including smaller units, denser housing, more amenity-rich properties, and a focus on apartments, condominiums, and townhouse-style projects as opposed to single-family developments. Potential positive community outcomes may include supporting workers in job centers and possibly supporting young adults transitioning into starting families. Developments could bring additional benefits to the neighborhoods, such as infrastructure improvements, additional green space and parks for residents, and the potential for mixed-use projects for small business owners and community-based organizations. To evaluate the Opportunity Zone incentive in Cluster 4, it will be important to look at trends such as the job-housing balance and outcomes for newcomers versus existing residents, particularly people of color, who currently make up just under one-half of the tract's population on average.

Finally, Cluster 5 Opportunity Zones are primarily suburban and largely consist of Hispanic families. They are the second densest cluster, have the lowest vacancy rates, have the second highest rents, and are the most homogenous based on their Gini coefficient. Investors meeting market needs would be encouraged to build housing targeted to families, with more bedrooms and higher square footage. There is likely room for development in these tracts due to the low vacancy rates and high rents. Community outcomes would affect families, children, Hispanic populations, immigrants, and other people of color. When evaluating the Opportunity Zone incentive in Cluster 3 tracts, it will be important to examine changes in housing quality and rates of overcrowding. It will also be important to evaluate the potential for displacement of lower income or smaller households.

Anchor Institutions

Anchor institutions such as large universities and hospitals play a significant role in how the Opportunity Zone designation affects their communities. They can play a significant role in economic and community development because they are strongly tied ("anchored") to their physical locations, serving large numbers of employees and clients (including visitors) and wielding influential voices in local governments and business communities. Anchor institutions may play a role in the Opportunity Zone context by directly investing in the capital stack for real estate or infrastructure projects or in businesses, influencing the decisions of other investors, and contributing to broader Opportunity Zone strategies tied to city or county economic development strategies.

Drexel University researchers have developed guidance to help governments and other leaders in communities make the most of their Opportunity Zone designations and build strong ecosystems to prepare communities for Opportunity Zone investment and to empower communities to shift the discussion from economic development to a focus on community wealth building. They discuss the strategic importance of anchor institutions, such as universities and hospitals, located in or near an Opportunity Zone:

"The Opportunity Zone incentive, and all the enthusiasm it has inspired, offers a unique chance for cities to organize multiple anchor institutions around a common goal of redevelopment and job creation in order to set their Opportunity Zones apart—with each anchor making contributions aligned with its mission and strengths according to its own community-focused needs."[26]

Exhibit 13 shows that the highest proportion of anchor institutions, as indicated by large universities and large hospitals, can be found in Cluster 4 tracts. However, Cluster 1 tracts also have a significant share, and they likely contain most Historically Black Colleges and Universities (HBCUs). Indian reservations, which have their own historical, legal, and community contexts that affect their current way of life and their potential for different kinds of Opportunity Zone investments, are most prevalent in Cluster 3 Opportunity Zones. An evaluation of the Opportunity Zone incentive should differentiate between census tracts with and without anchor institutions, Indian reservations, or other place-based entities, which may contribute to earlier success of attracting Opportunity Zone investment and creating a local ecosystem for continued attraction of public and private capital for a community development or community wealth-building focus.

Exhibit 13

Opportunity Zones, Anchor Institutions, and Indian Reservations

Cluster	Has large university (%)	Has large hospital (%)	Has Indian reservation (%)
1	4	5	1
2	2	3	0
3	2	1	7
4	9	9	1
5	0	2	1
NA (fewer than 100 households)	23	14	3

NA = not available.

Sources: Authors' calculations; U.S. Census Bureau, 2019a; U.S. Department of Homeland Security, n.d.

Conclusion

Through a cluster analysis based on housing and demographic variables, the authors developed a typology of Opportunity Zones, classifying them into five different clusters: rural, small-town, and tribal communities (36 percent of Opportunity Zones); underinvested majority-Black communities (26 percent); suburban majority-Hispanic families (19 percent); growing job hubs (13 percent); and metropolitan immigrant communities (6 percent). Clusters vary in their geographic distribution in ways that reflect both the diversity of neighborhoods across states and the different approaches states used to recommend their census tracts to be designated as Opportunity Zones. The results represent one typological approach, but clusters can also be broken down into smaller, more homogenous groups for further clarity.

[26] *From Transactions to Transformation: How Cities Can Maximize Opportunity Zones* by Bruce Katz and Evan Weiss, 2018, Drexel University. https://drexel.edu/nowak-lab/publications/reports/opportunity-zones/.

Opportunity Zone clusters have different assets and needs. The unique characteristics of the clusters may also contribute to investment demand and the potential returns that Qualified Opportunity Fund investors and their fund managers are seeking. A preliminary study of Qualified Opportunity Fund activities based on electronic Internal Revenue Service (IRS) tax filings found that initial investment has been concentrated in a subset of 16 percent of Opportunity Zones, which are relatively better off than other OZs (Kennedy and Wheeler, 2021). It would be interesting to examine the intersection between this subset of census tracts and the clusters described in this article, perhaps Cluster 4. With more transactional data, one would be able to inspect potential differences between types, levels, and timing of investments, as well as community outcomes, across different clusters of Opportunity Zones. A future evaluation could use the typology in this article alongside locational data on Opportunity Zone investments and the type of investments Qualified Opportunity Funds are pursuing, such as specific real estate asset classes or equity in specific stages of the business creation lifecycle. These data would ideally include the total number of investments and the dollars invested per transaction for each cluster. The authors hope this typology becomes useful for evaluating the incentive as data on Opportunity Zone transactions can be paired with existing IRS data and potential future data if more data reporting requirements become law.

Appendix

Appendix Exhibit 1

Opportunity Zones in the 50 States and D.C. with Fewer than 100 Households

Count	Description
17	Census tracts occupied largely by government-owned land and facilities, including prisons, airports, military bases, and parks
9	Census tracts dominated by large university or hospital campuses
5	Census tracts dominated by industrial and/or commercial land
4	Large census tracts consisting of rural and undeveloped land, appearing to be poised for tourism-related development
35	**TOTAL**

Source: 2019 ACS and authors' own analysis

Appendix Exhibit 2

Data Sources (1 of 2)

Tract urban form variables	
Population per square mile	Total residents, from the 2019 American Community Survey 5-year estimates (2019 ACS), divided by the area of the census tract
Population plus jobs per square mile	Sum of the jobs in 2016, from the U.S. Census Bureau's LEHD Origin-Destination Employment Statistics (LODES), and residents (from the 2019 ACS), divided by the area of the census tract
Percent urban area	Percent of residents living in an "urbanized area" from the 2010 decennial census
Percent urban cluster	Percent of residents living in an "urban cluster" from the 2010 decennial census
Percent rural area	Percent of residents living in a rural area from the 2010 decennial census
Jobs-to-resident ratio	Jobs in 2016 (from LODES) divided by residents (from the 2019 ACS)
Percent who drive alone to work	From the 2019 ACS
Percent who take public transit, walk, or bike to work	From the 2019 ACS
Tract housing variables	
Percent living in the same home as a year ago	From the 2019 ACS
Percent vacant	From the 2019 ACS
Percent of housing stock that is single-family detached	From the 2019 ACS
Percent of housing stock in buildings with 20+ units	From the 2019 ACS
Median gross rent	From the 2019 ACS
Median home value	From the 2019 ACS
Units built in 2014 or later	From the 2019 ACS
Percent who own home	From the 2019 ACS
Tract demographics variables	
Gini coefficient	From the 2019 ACS
Poverty rate	From the 2019 ACS
Median household income	From the 2019 ACS
Percent age 25 or older with a college degree	From the 2019 ACS
Household size	From the 2019 ACS

Appendix Exhibit 2

Data Sources (2 of 2)	
Percent of households that are families with children younger than 18	From the 2019 ACS
Percent of population 65 or older	From the 2019 ACS
Percent of population that is foreign born	From the 2019 ACS
Percent unemployed	From the 2019 ACS
Percent not in labor force	From the 2019 ACS
Percent White non-Hispanic	From the 2019 ACS
Percent Black	From the 2019 ACS
Percent Hispanic	From the 2019 ACS
Percent Asian	From the 2019 ACS
Tract temporal variables	
Absolute change in households from 2013 to 2019	From the 2013 American Community Survey 5-year estimates (2013 ACS) and 2019 American Community Survey 5-year estimates (2019 ACS)
Percent change in household income from 2013 to 2019	From the 2013 ACS and 2019 ACS
Percent change in rent from 2013 to 2019	From the 2013 ACS and 2019 ACS
Percentage point change in population with a college degree, 2013 to 2019	From the 2013 ACS and 2019 ACS
Regional housing variables	
Median home value, CBSA or county	Median home value for the CBSA containing the census tract (for census tracts in CBSAs) or median home value for the county containing the census tract (for census tracts outside CBSAs), from the 2019 ACS.
HUD Fair Market Rent	The 2021 HUD fair market rent for the Housing Market Area containing the census tract (does not include small area fair market rents).
Regional temporal housing variable	
CBSA/non-CBSA state home price index (2020, with 2012 base year)	Regional 2020 FHFA home price index with 2012 (shows change in home prices between 2012 and 2020 based on repeat single-family home sales). For tracts in CBSAs, this is for the CBSA containing the tract. For tracts outside CBSAs, this is for the non-CBSA portion of the state containing the tract.
Tract relationship to regional variables	
Ratio of median household income of tract to CBSA (or county if non-CBSA)	Tract median household income divided by median household income for the CBSA containing the tract (for census tracts in CBSAs) or for the county containing the tract (for census tracts outside CBSAs), from the 2019 ACS.
Ratio of median gross rent of tract to CBSA/county	Tract median gross rent divided by median gross rent for the CBSA containing the tract (for census tracts in CBSAs) or for the county containing the tract (for census tracts outside CBSAs), from the 2019 ACS.
Ratio of median home value of tract to CBSA/county	Tract median home value divided by median home value for the CBSA containing the tract (for census tracts in CBSAs) or for the county containing the tract (for census tracts outside CBSAs), from the 2019 ACS.

CBSA = Core Based Statistical Area. FHFA = Federal Housing Finance Agency. LEHD = Longitudinal Employer-Household Dynamics.

Appendix Exhibit 3

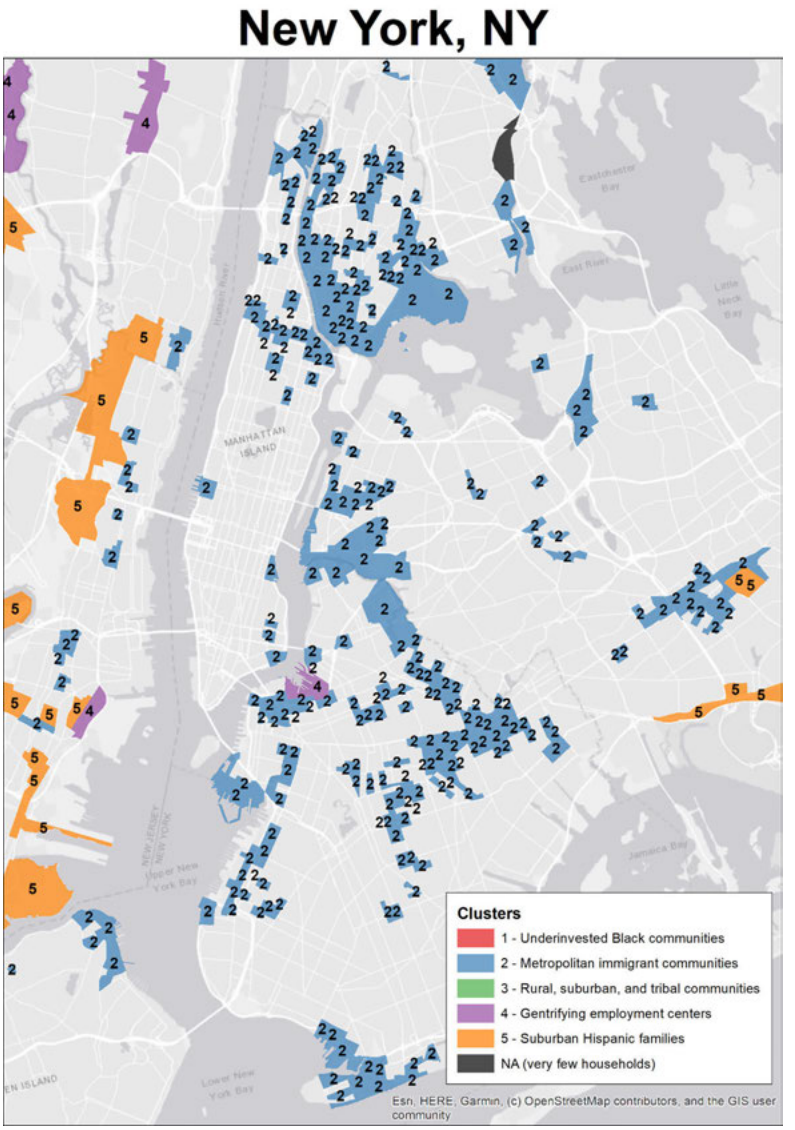
Rotated Factor Loadings from the Principal Components Analysis

Variable	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10
popdensity	0.23	0.01	0.04	0.3	0.06	0.13	0.04	0.14	0.03	0.18
jobpopdensty	0.22	0.01	0.12	0.21	0.01	0.14	0.02	0.06	0.19	0.29
pcturbarea	0.22	0.11	0.04	0.24	0.19	0.23	0.02	0.08	0.16	0.1
pcturbcluster	0.14	0.04	0.03	0.06	0.25	0.35	0.25	0.01	0.25	0.24
pctrurarea	0.18	0.11	0.02	0.28	0	0.05	0.29	0.11	0.04	0.12
jobsres	0.05	0.01	0.17	0.15	0.15	0.01	0	0.18	0.43	0.35
pctdrivealone	0.24	0.09	0.13	0.22	0.1	0.11	0.02	0	0.01	0.03
pcttransitwalkbike	0.23	0.08	0.18	0.23	0.13	0.1	0.03	0.06	0.02	0.04
pctsamehouse1yr	0.03	0.08	0.22	0.36	0.13	0.16	0.1	0.13	0.07	0.11
pctvac	0.13	0.12	0.12	0.14	0.23	0.06	0.11	0.29	0.19	0.06
pctdetached	0.23	0.09	0.16	0.01	0.08	0	0.06	0.03	0.04	0.08
pct20plus	0.21	0.03	0.23	0	0.18	0.04	0.02	0.01	0.11	0.12
medrent	0.22	0.22	0.05	0.06	0.18	0.04	0.03	0.04	0.21	0.24
medval	0.24	0.16	0.07	0.21	0.05	0.01	0.05	0.05	0.09	0.15
unitsblt2014	0.04	0.12	0.11	0.19	0.07	0.11	0.55	0.13	0.03	0.09
pctown	0.24	0.19	0.09	0.15	0.1	0.1	0.11	0.03	0.05	0.01
gini	0.04	0.19	0.19	0.1	0.09	0.06	0.22	0.13	0.14	0.26
povrate	0.05	0.34	0.01	0.04	0.07	0.21	0.1	0.14	0.01	0.11
medhhinc	0.05	0.37	0.01	0.01	0.16	0.06	0.02	0.06	0	0.01
pctcoll	0.1	0.19	0.31	0.13	0.06	0.02	0.01	0.02	0.13	0.12
hhsize	0.08	0.05	0.39	0.08	0.05	0.2	0.12	0.12	0.03	0.02
pctfamilies	0.05	0	0.38	0.04	0.03	0.28	0.07	0.01	0.05	0.05
pct65over	0.16	0.05	0.13	0.26	0.06	0.38	0.03	0.01	0.08	0.06
pctforborn	0.24	0.08	0.17	0.07	0.18	0	0.03	0.09	0.09	0.01
pctunemployed	0.02	0.27	0.06	0.02	0.17	0.05	0.14	0.05	0.05	0.13
pctnotinlf	0.13	0.18	0.04	0.25	0.12	0.09	0.19	0.23	0.2	0.12
pctwhtnh	0.18	0.18	0.21	0	0.19	0.04	0.16	0.02	0.04	0.05
pctblck	0.04	0.25	0.03	0.03	0.45	0.05	0.11	0.17	0.05	0.1
pcthisp	0.15	0.04	0.29	0.02	0.25	0.12	0.07	0.16	0.07	0.17
pctasian	0.16	0.09	0.03	0.03	0.09	0.09	0.1	0.1	0.11	0.35
abshhs1319	0.09	0.08	0.05	0.2	0.17	0.05	0.49	0.33	0.05	0.02
pctinc1319	0.06	0.1	0.03	0.13	0.23	0.01	0.02	0.49	0.3	0.29
pctrent1319	0.08	0.1	0.03	0.13	0.14	0.13	0.01	0.4	0.09	0.19
absppcoll1319	0.07	0.09	0.12	0.1	0.17	0.06	0.13	0.2	0.44	0.17
mktmedval	0.26	0.1	0.11	0.09	0.06	0.23	0.03	0.03	0.09	0.18
hudfmr	0.27	0.08	0.1	0.09	0.01	0.22	0.02	0	0.06	0.16
trctmktinc	0.13	0.33	0.03	0.06	0.1	0.12	0.08	0.04	0.07	0.08
trctmktmedrnt	0.04	0.24	0.07	0.1	0.25	0.29	0.06	0.01	0.39	0.18
trctmktmedval	0.04	0.19	0.23	0.19	0.06	0.23	0.14	0.09	0.04	0.05
hpimetst20	0.11	0.05	0.16	0.16	0.23	0.29	0.15	0.25	0.01	0.06

Appendix Exhibit 4

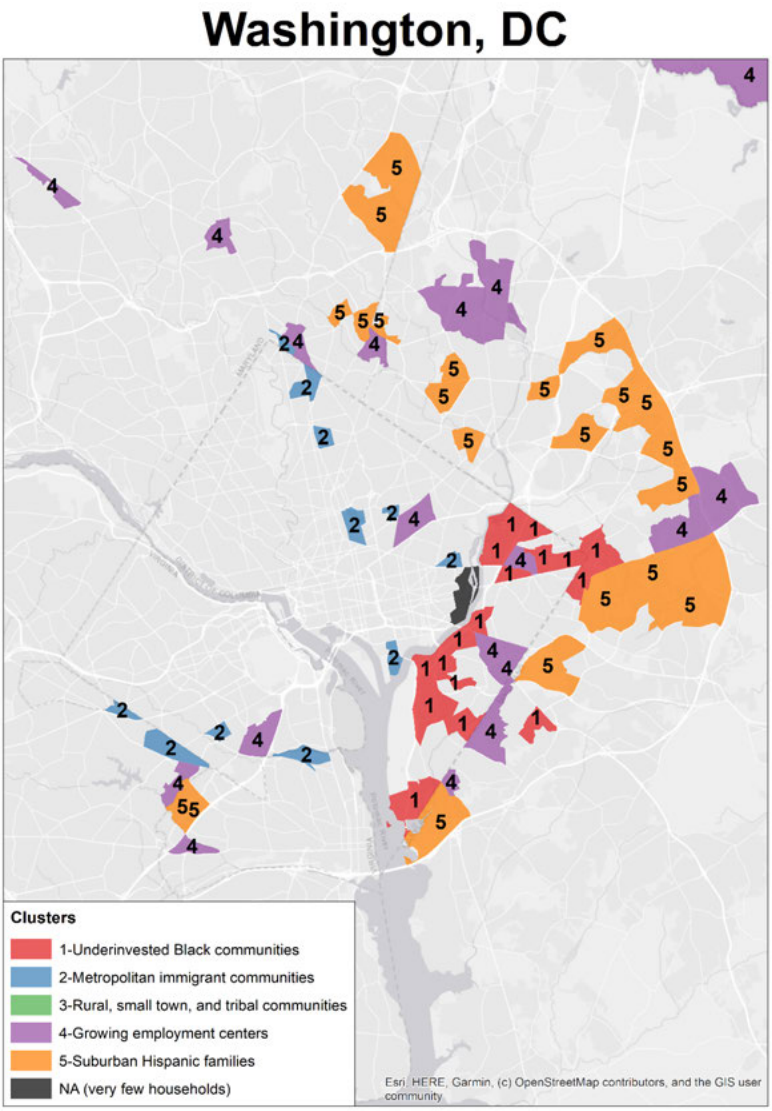
Opportunity Zone Clusters in Example Areas (1 of 6)

Opportunity Zones are colored and labeled by cluster. Dark gray tracts are Opportunity Zones with fewer than 100 households that were excluded from the cluster analysis. Maps were created by the authors using ArcGIS® software by Esri. These maps and additional examples are available online here: https://bit.ly/3JBECeF.



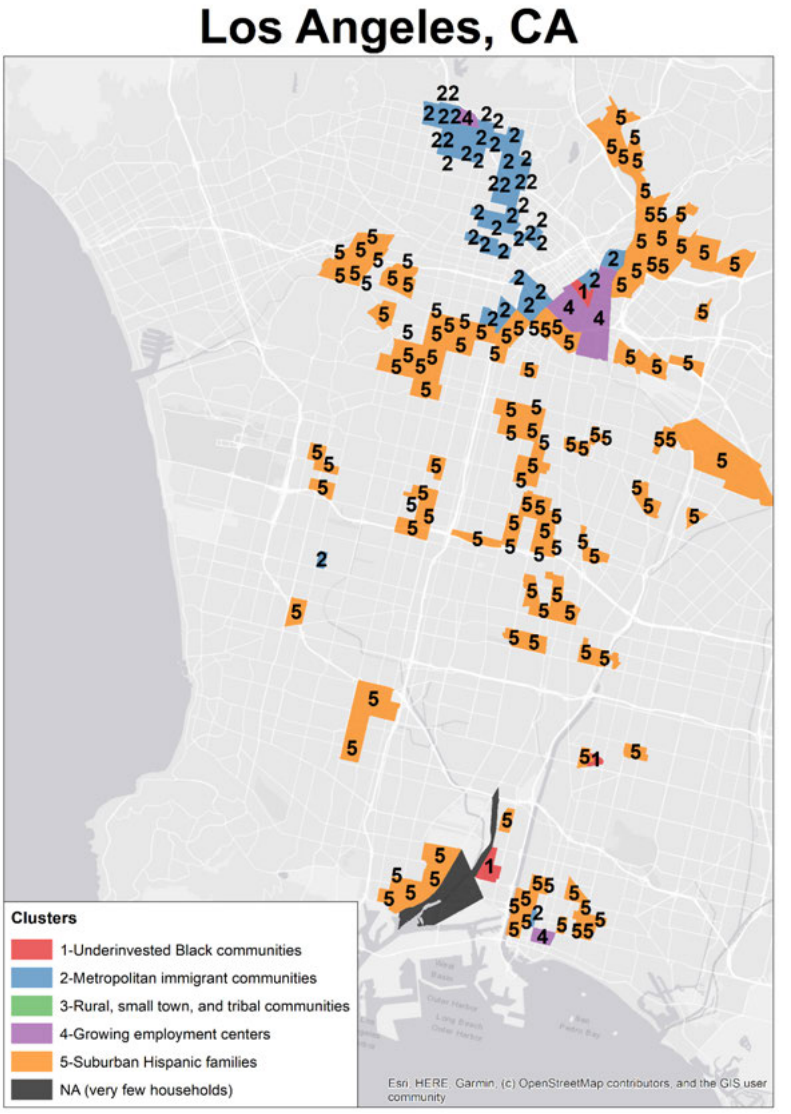
Appendix Exhibit 4

Opportunity Zone Clusters in Example Areas (2 of 6)



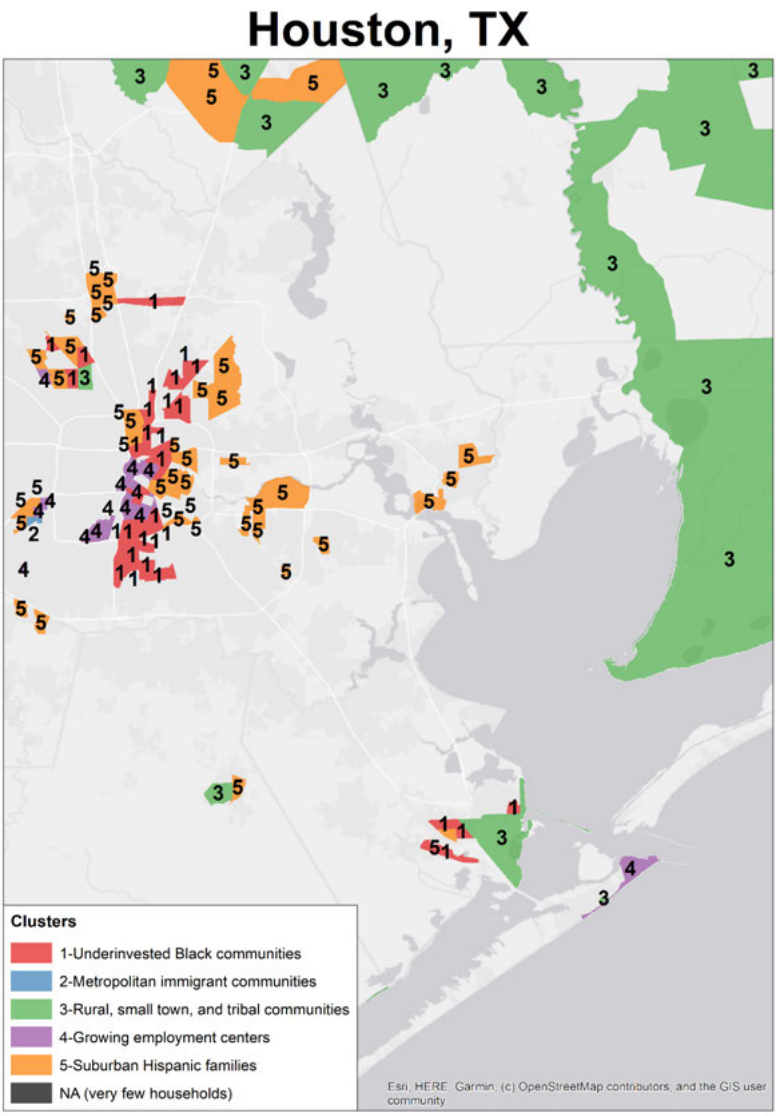
Appendix Exhibit 4

Opportunity Zone Clusters in Example Areas (3 of 6)



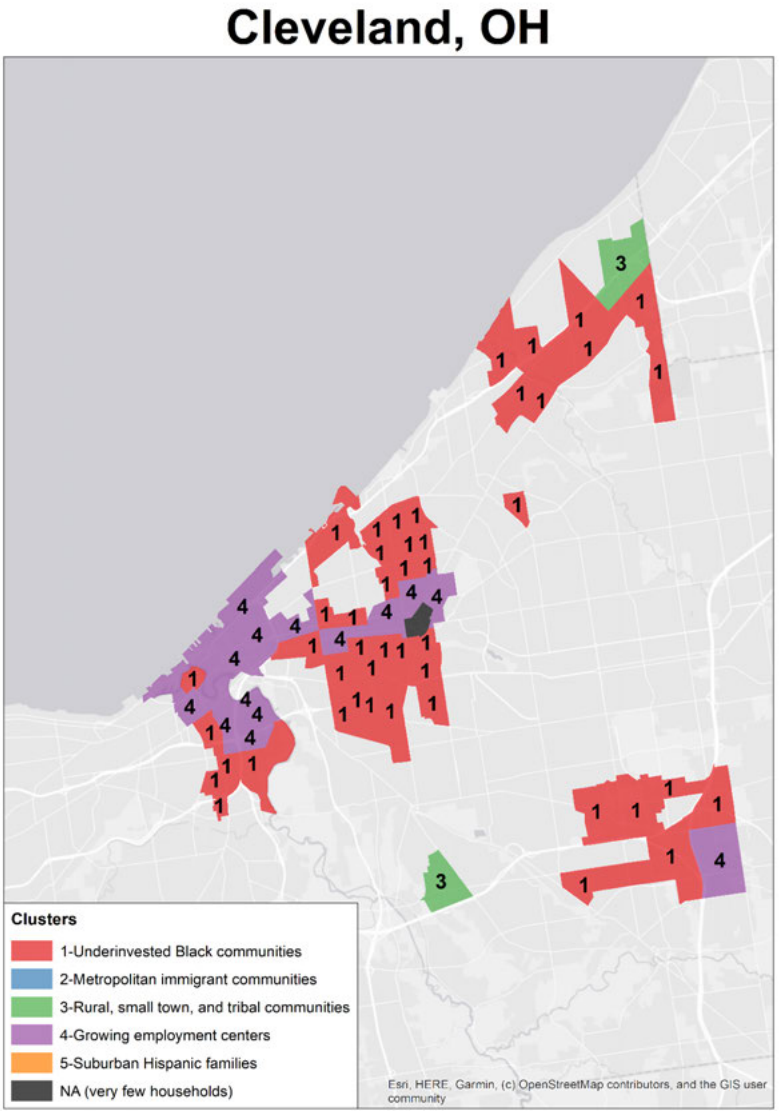
Appendix Exhibit 4

Opportunity Zone Clusters in Example Areas (4 of 6)



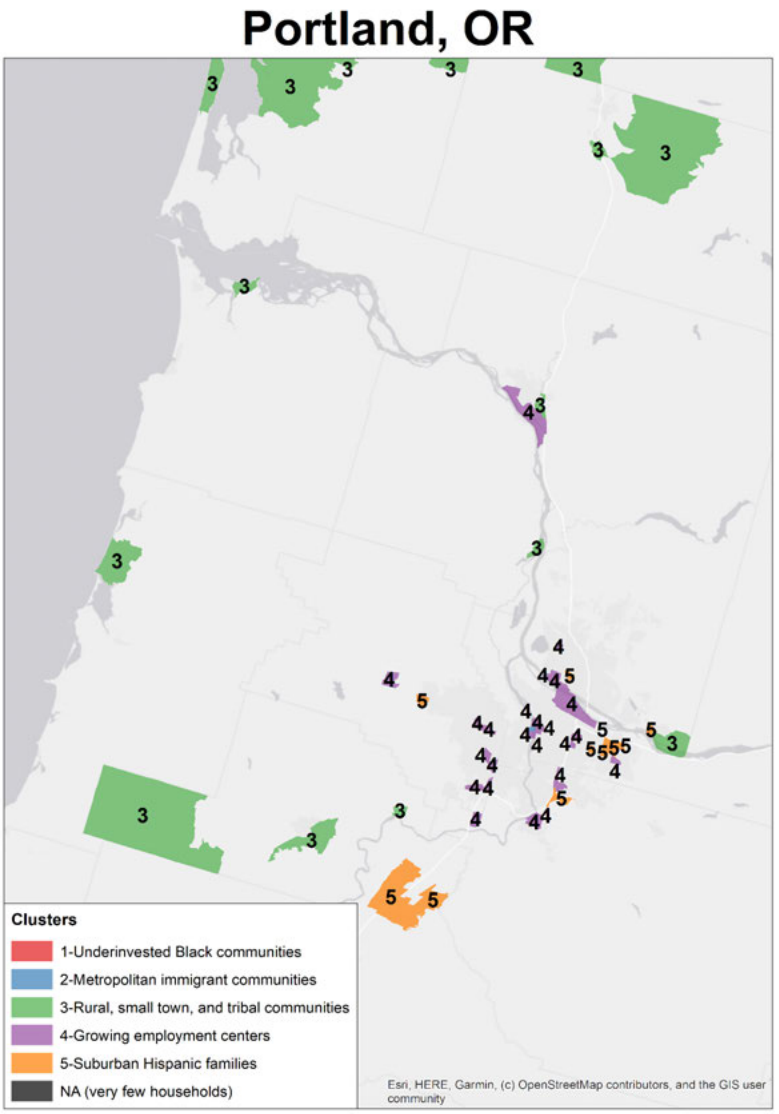
Appendix Exhibit 4

Opportunity Zone Clusters in Example Areas (5 of 6)



Appendix Exhibit 4

Opportunity Zone Clusters in Example Areas (6 of 6)



Sources: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, 2015; U.S. Census Bureau, 2019a.

Acknowledgments

We are grateful to Mia Bailey, Ronald Wilson, Alastair McFarlane, Michael Hollar, Brent Mast, and Pamela Blumenthal for providing guidance and feedback on this article. We also thank Pramod Pamnani and Alexander Din for providing data on HUD-assisted households in Opportunity Zones.

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Classifying Opportunity Zones—A Model-Based Clustering Approach

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Abstract

Objective: Opportunity Zones (OZs) are the first major place-based economic development policy from the federal government in nearly two decades. To date, confusion persists among planners and policymakers in some places as to what features of OZ tracts matter for their inclusion, and, secondly, what features of OZ tracts make them attractive targets for potential investment. The authors developed a typology of OZ tracts in order to offer planners and policymakers alternative ways of organizing a highly variable set of tracts.

Methods: This study employs model-based clustering, also known as latent class analysis, to develop a typology OZ tracts from the population of all eligible tracts in the United States. The authors use publicly available data from the U.S. Census Bureau and Urban Institute in developing the typology. Descriptive statistics and graphics are presented on the clusters. Using Portland, Oregon, as an example city, the authors present a cartographic exploration of the resulting typology.

Results: OZs present with immense variation across clusters. Some clusters, specifically cluster 3 and 9, are less poor, have a greater number of jobs and higher development potential than other clusters. Additionally, these exceptional clusters have disproportionate rates of final OZ designation compared to other clusters. In Portland, these less distressed clusters make up the majority of ultimately designated OZ tracts in the city and are concentrated in the downtown area compared to the more deprived eastern part of the city.

Conclusions: We find that OZ designation is disproportionately seen in particular clusters that are relatively less deprived than the larger population of eligible tracts. Cluster analysis as well as other forms of exploratory or inductive analyses can offer planners and policymakers a better understanding of their local development context as well as offering a more coherent understanding of a widely variant set of tracts.

OZs, the newest federal government place-based economic development tool since the New Markets Tax Credit in the early 2000s, has reportedly marshaled more than $50 billion in investment in the 2 years since its passage (Drucker and Lipton, 2019). Opportunity zones allow investors to defer taxes on their capital gains if they invest in qualified Opportunity Zone funds in development-starved census tracts.

Abstract (continued)

Recent investigations show a disproportionate amount of investment being steered into a minority of tracts that formally qualified for the program based on their income but are not suffering from a lack of development (Buhayar and Leatherby, 2019; Drucker and Lipton, 2019; Ernsthausen and Elliott, 2019).

A central tension in those articles concerning Opportunity Zone investment is that the Tax Cut and Jobs Act of 2017 used a broad qualifying rule for Opportunity Zone designation based only on tract income to maximize flexibility. It resulted in variations within designated Opportunity Zones in terms of their socioeconomic characteristics but also redevelopment attractiveness. An important issue for economic development researchers and analysts is to find alternative ways of organizing Opportunity Zones into more useful categories of analysis than simply qualified or non-qualified Opportunity Zone designations.

This paper presents model-based clustering, also known as latent class analysis. This unsupervised machine learning technique is one way to address the difficulties of classifying designated Opportunity Zone tracts. The remainder of this article will offer background on some troubling OZ issues, a description of latent class analysis through model-based clustering, and the results of cluster analysis and its relationship with Opportunity Zone designation. The findings contribute to a better understanding of the variation of eligible tracts and what features make the zones attractive for designation.

Background

Opportunity Zone Concerns

This article will not cover the extensive background on the OZ program design and history because it has been well documented in this issue. Still, it is important to note OZs have been particularly successful in garnering extensive investments in a short time. Early estimates showed more than $50 billion already invested in OZs through Qualified Opportunity Funds (QOFs) in 2019. Taking the COVID-19 pandemic into account, the authors suggest that OZ investment has very likely continued to grow at a healthy clip (Drucker and Lipton, 2019).

Investment numbers aside, OZs have multiple areas of concern. First, until recently, no mechanisms were available for tracking investment in OZs because such a requirement was not included in the basic legislation. The Treasury Department recently modified form 8996, which requires investors to report that they meet the 90-percent investment standard for investing in an OZ property within a QOF. Although this was a much-needed reform, the form 8996 data are not publicly available, but some recent work has used those data (Kennedy and Wheeler, 2021). As such, it is impossible to track exactly in what QOFs are investing and, more importantly, where such investments are going. With the revision to form 8996 and the prospect of publicly available QOF data, however, researchers may have the information necessary to better track and evaluate the program. Second, OZ designation was intentionally designed to encourage flexibility on the part of states, but the rules for designation are an income cut-off. The income rules, taken from the eligibility requirements of the New Markets Tax Credit program, specify all census tracts with

a poverty rate equal to or greater than 20 percent for tracts within metropolitan areas and 80 percent of state median family income for tracts in nonmetropolitan areas. Those income rules yielded a qualified pool of approximately 31,000 tracts. Of that pool, the states could nominate up to 25 percent of eligible tracts for designation. Those broad income rules allow for a significant amount of variation within qualified Opportunity Zones and bring about basic questions as to how disinvestment is understood by the federal government.

This flexibility and variation of qualified Opportunity Zones, framed as a boon to investors seeking successful returns, also exposes Opportunity Zones to various inefficiencies. First is the concern that Opportunity Zone designation offers tax cuts for investments that would have already occurred in low-income, albeit commercially attractive, tracts. That concern is a central theme of recent journalistic pieces highlighting Opportunity Zone activity in major downtown areas of multiple cities that are undergoing building booms (Buhayar and Leatherby, 2019; Drucker and Lipton, 2019). This kind of program design not only robs the Treasury of potential capital gains tax revenue but also potentially siphons investment away from marginal tracts that nevertheless would be attractive targets for investment if not for the existence of exceptional low-income but development-rich tracts.

Designation and Investment Questions

Improper designation of eligible tracts creates a risk of tracts that might not need additional incentives for investment, crowding out tracts that need help attracting investment. This risk is present in many place-based programs, but evidence indicates that OZs are more extreme than other programs regarding improper designation. In a recent piece, Brazil and Portier (2021) compared tract designations across four federal place-based programs: the New Markets Tax Credit, Opportunity Zone, Low Income Housing Tax Credit, and Community Development Financial Institution Fund programs. The authors found that although all four programs suffer from potential designation issues by selecting tracts already in a process of gentrification, OZ-designated tracts were nearly twice as likely to be gentrifying compared with tracts eligible in the comparator programs. In terms of investment, Kennedy and Wheeler (2021) found that in their sample of OZ returns, 84 percent of designated tracts did not receive any investment. Furthermore, they found that tracts receiving funding had generally higher incomes, educational attainment, population densities, and amenities.

Those recent works offer information on some of the potential imbalances within OZs and make better identifying and organizing potentially attractive OZs an urgent task for planners and policymakers. The rest of this paper explores developing and offering a typology of tracts.

Data and Methodology

Data

The primary dataset comprises three publicly available data sources:

- American Community Survey (ACS).
- Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics (LEHD LODES) from the U.S. Census Bureau.
- Opportunity Zone Investment Score tool from the Urban Institute

American Community Survey Neighborhood Deprivation Index

Using the 2011–2015 ACS, the authors estimated a composite neighborhood deprivation index (NDI). The NDI developed by Messer et al. (2006) is a composite measure of material deprivation derived from the first principal component of a set of census variables. The NDI is made up of the first component of a set of 8 out of 20 census variables: share of males in management and professional occupations, share of crowded housing, share of households in poverty, share of female-headed households with dependents, share of households on public assistance, share of households earning less than $30,000 per year, share of the population earning less than a high school diploma, and share unemployed. This component is estimated using principal component analysis, a dimension reduction technique. Across the different regions Messer and her colleagues used to calibrate their measure, the first component accounted for up to 73 percent of variation. Final component scores were standardized with a mean of 0 and a standard deviation of 1. The NDI allows for a multidimensional measure of deprivation above and beyond the inclusion of only income-related variables.

LEHD LODES

Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES) Workplace Area Characteristics (WAC) data were collected for the year 2016 for all eligible census tracts (U.S. Census Bureau, 2019). The LODES data are a mix of administrative datasets, including Unemployment Insurance, Quarterly Census of Employment and Wages filings, and additional censuses and surveys. The public data provide geographically fine data on where employees live and work. From the LODES WAC files, data were collected on employment information for all primary jobs (LEHD job type code "JT01"), aggregated to the census tract level across all available industries using the lehdr package in R (Green, Mahmoudi, and Wang, 2019; R Core Team, 2020). LEHD industry employment estimates were further reduced from 20 industry categories to 4 principal components to aid clustering.

Opportunity Zone Investment Tool

The Urban Institute developed a tool (Theodos et al., 2018) that ranks the investment attractiveness of eligible OZ tracts. The investment score summarizes how multiple investments flow into a tract on the basis of commercial, multifamily, single-family, and small business lending.

Commercial and multifamily lending flows were taken from 2011–2015 CoreLogic, Inc.[1] data on loans (single loans less than $100 million), aggregated at the census tract level. The commercial lending score is an investment-to-employee ratio calculated from an annual average of the value of the loans divided by the number of employees in a tract derived from the LODES workplace association file for all tracts with at least 200 jobs. The multifamily lending score used an annual average at the tract level divided by the number of multifamily units derived from the 2011–2015 ACS. The multifamily score was calculated for census tracts with at least 200 multifamily units. The single-family lending score used 2011–2015 Home Mortgage Disclosure Act[2] home purchase loans averaged at the tract level divided by the number of single-family units with at least 200 single-family units. Finally, the small business lending score used Community Reinvestment Act data from 2011–2015.[3] Similar to the other measures, this score estimates an annual average at the tract level divided by the number of small business employees in a tract. The number of small business employees was derived from the LODES WAC file for employees in firms with 19 or fewer workers. The final composite score is the average of the z-scores for each component for all eligible tracts. Finally, tracts within the same territory or state were given a decile ranking of the z-scores, for a final score of 1–10. The investment score data table also includes a "social change" flag as a rough estimate of gentrification, but it is not used in this analysis.

Methodology

Dimension Reduction Through Principal Component Analysis

Before clustering, it is often necessary to perform a dimension reduction for two reasons. First, cluster analyses can be computationally expensive in the face of many independent variables, so determining a more optimal combination of variables before clustering can save time. Second, many clustering algorithms can have highly correlated predictor variables that can degrade the performance of an algorithm.

Principal component analysis is a tool to reduce the data dimension of several interrelated variables while maximizing the variability to present the data. This step can be achieved by transforming the original variables into a new set of orthogonal variables, called principal components; each component is a linear combination of the original variables. The principal components are uncorrelated and summarize a decreasing portion of the total variance of the original data. This method is useful when the original variables are correlated, and a large portion of the data variance can be captured by the first few principal components (Shiva Nagendra and Khare, 2003). Employment data of different industry sectors for each census tract were gathered for the analysis. More than 20 industry sectors are specified in the LODES workplace association file, and most are highly correlated with each other. Thus, principal component analysis(PCA) is a promising approach to reducing the high dimensional nature of industry data compared with removing or manipulating certain industry sector variables manually.

[1] Theodos, Brett, Brady Meixell, and Carl Hedman. 2018. *Did States Maximize Their Opportunity Zone Selections?* Washington, D.C.: Brookings Institution, Metropolitan Housing and Communities Policy Center. https://www.urban.org/policy-centers/metropolitan-housing-and-communities-policy-center/projects/opportunity-zones-maximizing-return-public-investment

[2] Ibid.

[3] Ibid.

The **psych** package in R version 4.0 is used to calculate the principal components. Varimax rotation is specified to maximize the sum of the variances of the squared loadings (the linear combination weights) to highlight a small number of important variables. This rotation technique enables each principal component to have only a small number of variables with larger loadings, whereas the rest of the variables in a component are close to zero. This step helps with the overall interpretability of the principal components.

Latent Class Analysis in mclust

Also known as "cluster analysis," latent class analysis can be broadly defined as classifying similar objects into groups in which the number and form of groups are unknown (Vermunt and Magidson, 2002). Multiple techniques, ranging from relatively simple algorithms such as k-means clustering to advanced hierarchical methods, exist.

This paper uses a model-based approach to group Opportunity Zone tracts into clusters based on shared attributes. Model-based approaches differ from techniques such as k-means by estimating a series of models for determining cluster membership. A model-based approach offers the analyst the following advantages over other clustering techniques. First, cluster membership is based on the predicted probability of membership as opposed to partitioning on some summary value, meaning that the membership results are less arbitrary, and the probabilistic nature of these clusters allows for the display of uncertainty of membership given model parameters. Second, because the analyst does not have to provide a preset number of clusters or classifiers, model-based approaches are truly data driven. Third, the model-based approach can take both continuous and discrete data and does not require scaling of variables (Vermunt and Magidson, 2002: 5–6).

The general form of Gaussian finite mixture models takes an estimated probability density function calculated in the mixture model for a model of K number of clusters:

$$f(x_i;\theta) = \sum_{k=1}^{K} \pi_k f_k(y_i \mid \theta_k)$$

θ takes the form of the parameter of the mixture model, whereas $f_k(y_i|\theta_k)$is the *kth* cluster density for observation x_i, with θ_k being the mixing probabilities in the final *K* groups (Scrucca et al., 2016). Because the form of the parameters that make up individual clusters is unknown, mixture models use a Maximum Likelihood Estimator (MLE) for calculating group membership. Although a Gaussian is assumed for basic mixture models, final clusters can take multiple shapes with differing volumes and orientations as calculated from their covariance matrices (Scrucca et al., 2016; Vermunt and Magidson, 2002). This geometric flexibility of mixture models is another advantage that allows for a wider variety of distributions to define cluster membership than basing membership on a single summary statistic or presupposing the underlying data structure. Researchers offer multiple ways to evaluate final models. The Bayesian Information Criterion (BIC) is generally used as a measure of model fit, and the model that maximizes BIC is generally considered best given the data provided. Another likelihood measure, the integrated complete-data likelihood (ICL), uses BIC as one of its terms and penalizes the initial BIC score by how much overlap exists among clusters (Scrucca et al., 2016: 9).

The **mclust** package in R version 4.0 was used to estimate clusters (R Core Team, 2020; Scrucca et al., 2016).

Results

Employment-based Principal Components Analysis

To better represent the local economic context of OZ tracts, a principal component analysis (PCA) was performed on the 20 industry sectors present in the 2016 Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES) workplace association file. The PCA with varimax rotation returned a list of principal components (RCs). The first four RCs take account of 50 percent of the variance of the overall employment structure. One can further apply those RCs to the cluster analysis to represent the economic activity of the tracts.

Exhibit 1 displays the loadings estimated from the principal component analysis. The loadings are the correlations of the variables to their principal component. The variables with correlations greater than 0.5 for their respective components are bolded to show what variables strongly affect that component (we do not include correlation estimates less than .1 for clarity). Examining these highly correlated loadings provides a better interpretation of what the loadings represent as a combination of variables.

Exhibit 1

PCA Loadings from LEHD LODES

Industries	RC1	RC2	RC3	RC4
Agriculture				
Mining	0.193	0.151	**0.519**	-0.328
Utilities		0.11	**0.805**	
Construction	0.25	**0.729**		
Manufacturing		**0.68**		
Wholesale	0.267	**0.802**		
Retail	0.361	0.363	-0.115	0.349
Transportation and Warehousing		**0.561**		
Information	**0.582**		0.123	
Finance	**0.771**		0.124	
Real Estate	**0.719**	0.276		0.167
Professional Services	**0.86**		0.181	
Management	**0.54**	0.1	0.228	-0.111
Administration and Support	**0.622**	0.447		0.117
Education			0.11	**0.642**
Health Care	0.149		0.103	**0.667**
Arts	0.239		**0.543**	0.197
Accommodation and Food	**0.645**	0.128	0.118	0.338
Other	**0.672**	0.216		0.225
Public Administration	0.158		**0.74**	0.213

LEHD = Longitudinal Employer-Household Dynamics. LODES = Origin-Destination Employment Statistics. PCA= principal component analysis. RC = Principal Component.

Note: Loadings more than 0.5 are bolded for clarity; loadings less than .1 are excluded.

Source: Authors' calculation from the LEHD LODES Workplace Area Characteristics (WAC) files

The first component entails a mix of professional, food, and other services, including real estate, management, administrative and waste support, finance, information technology, other, and food/accommodation services. This component falls into a more traditional understanding of "services" employment. The second component includes more traditional "industrial" jobs, including construction, manufacturing, wholesale/warehousing, and transportation. The third component is a more eclectic mix, including the arts, public administrative services, mining, and utilities. The final component encompasses educational and health services.

Cluster Analysis

The final dataset used to estimate the clusters includes the 30,983 eligible tracts (exhibit 2). The data were clustered on six variables:

- The Urban Institute investment score.
- The four principal components derived from the 2016 LEHD LODES industry employment.
- The standardized score of the neighborhood deprivation index.

The final estimate returned nine clusters. The following section covers the features of the clusters estimated and provides descriptive results of the predictor variables from the cluster analysis and a simple statistical test on the probability of a tract being selected as an Opportunity Zone on the basis of cluster identification.

Exhibit 2

Cluster Descriptive Stats

Cluster	Number of Tracts	Designated (%)	NDI	Urban Inst. Score	RC1	RC2	RC3	RC4
1	3,346	33.59%	0.75	5.4	0.162	-0.128	0.043	0.4901
2	3,525	14.64%	1.10	3.5	-0.210	-0.332	-0.037	-0.3544
3	2,103	40.94%	0.73	6.8	0.574	1.042	0.127	0.9451
4	4,379	25.65%	0.94	5.9	-0.088	-0.018	-0.100	-0.2155
5	4,577	16.91%	0.69	4.7	-0.205	-0.229	-0.034	-0.3234
6	4,211	18.26%	1.00	5.1	-0.136	-0.324	-0.071	-0.2190
7	3,478	32.81%	0.75	6.3	-0.024	0.538	-0.122	-0.0086
8	4,916	24.92%	0.68	4.8	-0.124	-0.224	-0.013	-0.0158
9	448	45.98%	0.30	7.4	3.539	2.529	2.453	2.4006

NDI = neighborhood deprivation index. RC = Principal Component

Note: NDI, Urban Institute, and RC values are group means.

Source: Authors' calculations of American Community Survey (ACS) for the NDI, Urban Institute Investment tool and Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES) Workplace Area Characteristics (WAC) files

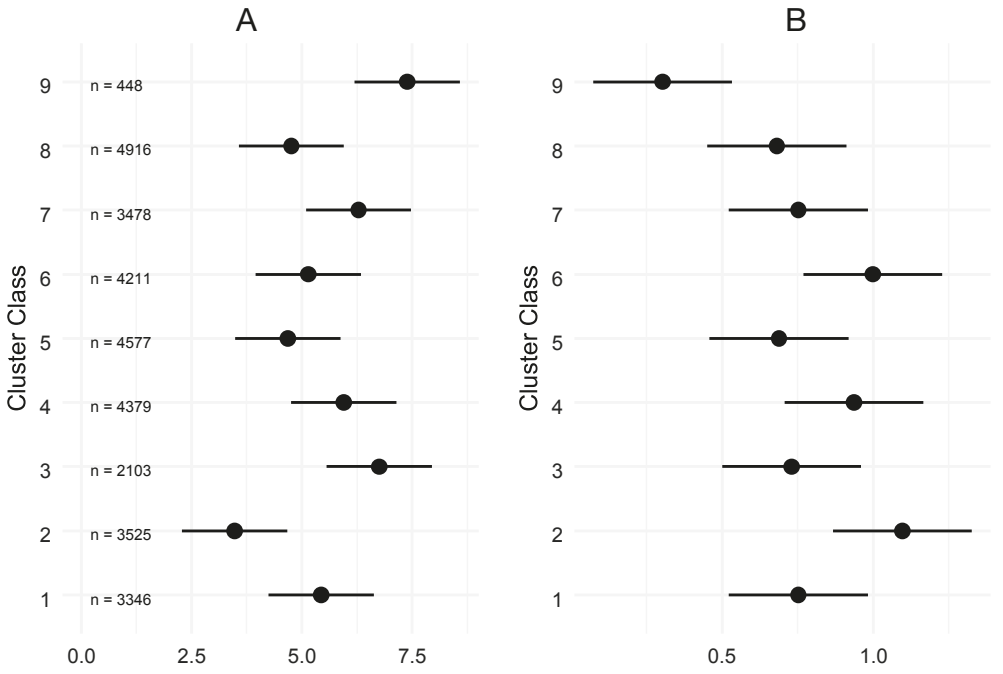
Comparison of the Clusters

Examining the variation in features that went into the cluster analysis across the estimated classes is one way of exploring their differences. The following plots present the means and standard deviations of the clustering variables to visualize where they differ and overlap.

Exhibit 3 shows the mean and standard deviation scores for the clusters' investment (group A) and neighborhood deprivation scores (group B) Of particular interest are clusters 3 and 9, which exhibit larger average investment scores and lower deprivation scores. Cluster 9, in particular, has the highest average investment score and the lowest average neighborhood deprivation index (NDI) score.

Exhibit 3

Clusters 3 and 9 Exhibit Higher Investment Potential and Lower Neighborhood Deprivation

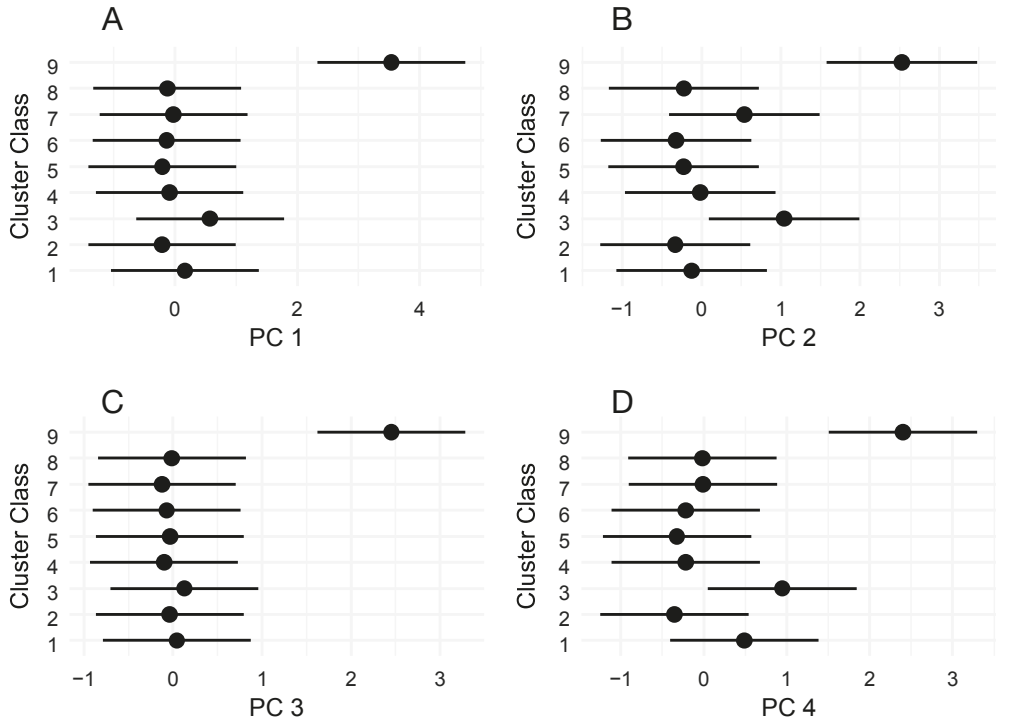


Source: Authors' calculations

Beyond the investment and deprivation scores, the employment principal components also highlight some extreme differences across clusters, particularly for cluster 9 (exhibit 4). The employment principal components represent not just a combination of variables that one can interpret as types of employment mixes but values estimated on the counts of jobs. As such, cluster 9 and, to a lesser extent, cluster 3, have much higher principal component scores due to the high absolute number of jobs found in their respective tracts. Additional individual clusters show higher average scores for individual components. Cluster 7, for example, has greater employment in the second component. The second component is made up primarily of industrial-type jobs, such as manufacturing, warehousing, and wholesale operations. Cluster 7 also has one of the higher average investment scores and one of the higher proportions of tracts ultimately designated even with a relatively larger overall number of tracts.

Exhibit 4

Cluster 9 Has Much Higher Employment Across All Types than Other Clusters

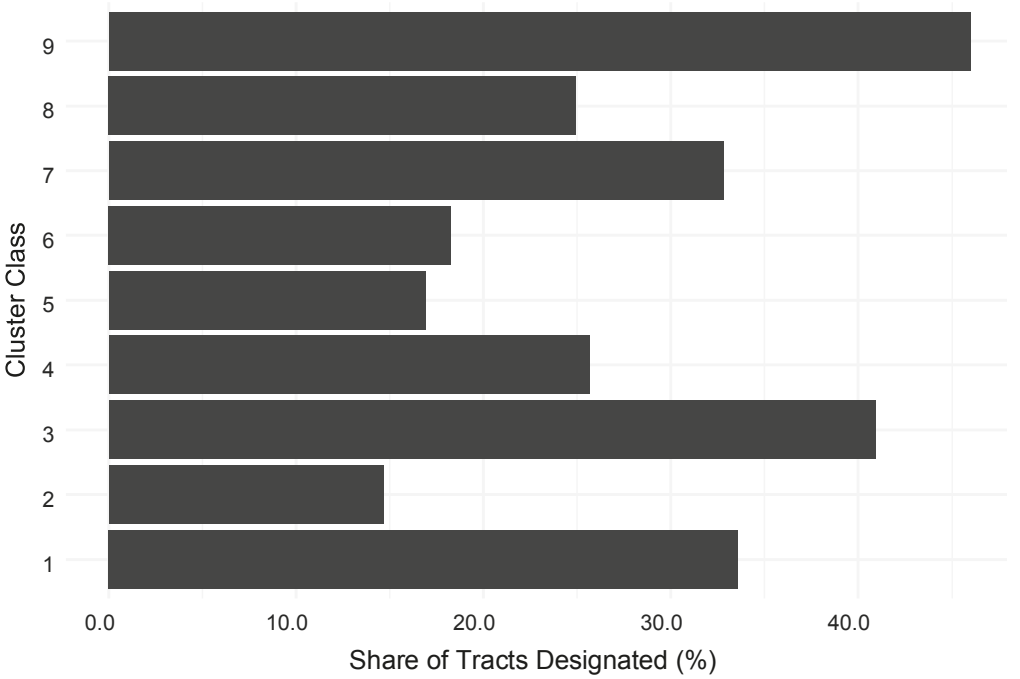


PC = principal component.
Source: Authors' calculations

Finally, one can examine the variation in OZ designation across the cluster. The basic selection process for designation allowed for states to designate up to 25 percent of eligible tracts. Individual clusters have widely variable shares of tracts that were ultimately designated. Across all classes, the average proportion of tracts ultimately designated as Opportunity Zones is approximately 28 percent, but the values range from 14.5 to 46 percent (exhibit 5). Clusters 9 and 3 have 46.0 percent and 40.9 percent of their tracts, respectively, designated as an Opportunity Zone, whereas only 14.6 percent of the tracts in cluster 2 were ultimately designated. As a check, a chi-square test was conducted to examine whether the distribution of designated tracts differs across the nine clusters.

Exhibit 5

OZ Designation Varies Widely Across Classes



Note: Chi-square statistic is 1100.2, which is below the significance level of 0.01, indicating that the Opportunity Zone designation across different clusters is statistically different.

Sources: U.S. Treasury Community Development Financial Institutions Fund; Authors' calculations

Discussion

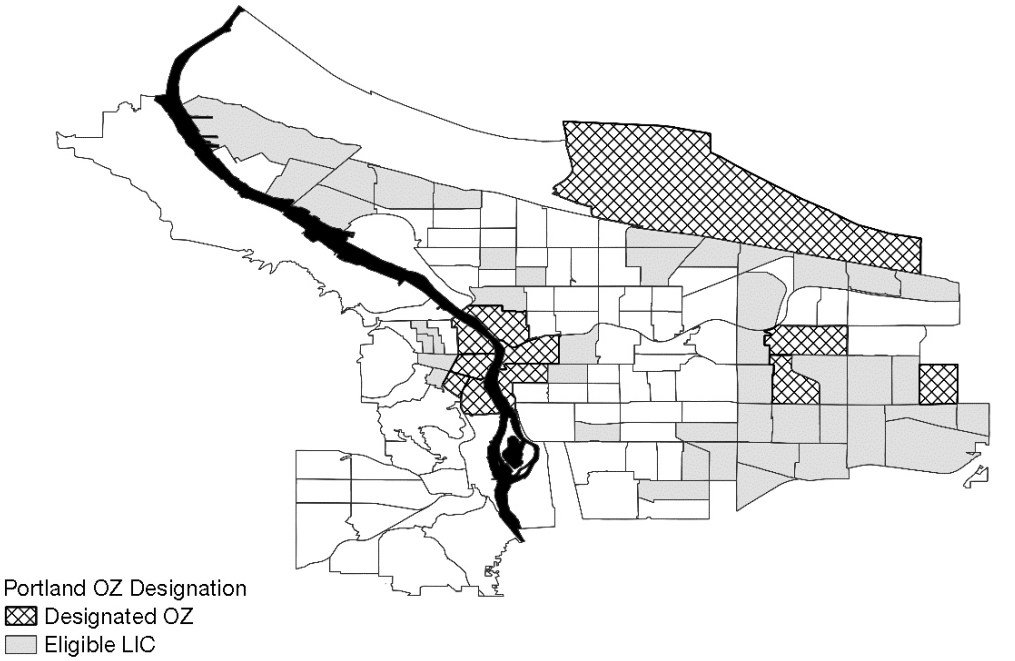
This analysis is not the final say on a typology of tracts, but it offers a workable typology to gain a better understanding of the underlying variation of tracts and their relationship to their final designation. Clusters 3 and 9 stand out as interesting cases worthy of further exploration. Both clusters have higher average investment scores, lower neighborhood deprivation index scores (NDIs), and larger employment scores. Cluster 9 is the most extreme due to its overall smaller size but also because of the extreme average values across clustering variables. One way to explore this in more depth is through a cartographic review. The following paragraphs explore the Opportunity Zone geography of Portland, Oregon, to showcase how these clusters relate to social and economic geography of the city. Portland was chosen because of the authors' familiarity with and work in the region and because the city has been highlighted as a particularly extreme example of potential Opportunity Zone abuse (Buhayar and Leatherby, 2019).

Overall, 62 tracts were eligible for OZ designation in the city of Portland, and 11, or approximately 21.5 percent, were ultimately designated as Opportunity Zones (exhibit 6). The eligible tracts cover a wide array of the social geography of Portland, with the bulk of eligible tracts in the outer east part of the city. East Portland is predominately working class—it is a low-income area of the

city with a large immigrant and non-White population and a growing Black population due to gentrification pressures in the inner northeastern part of the city (Gibson, 2007; Goodling, Green, and McClintock, 2015). Although an area of modest incomes, East Portland is a growing part of the city that is relatively underinvested compared with the inner east and western parts of the city. Eventual OZ designation is concentrated in the downtown/Central Eastside area of the city and a handful of tracts designated in outer east Portland—not including the tract that holds Portland International Airport, in the northeastern section of the city.

Exhibit 6

Portland OZ Designations

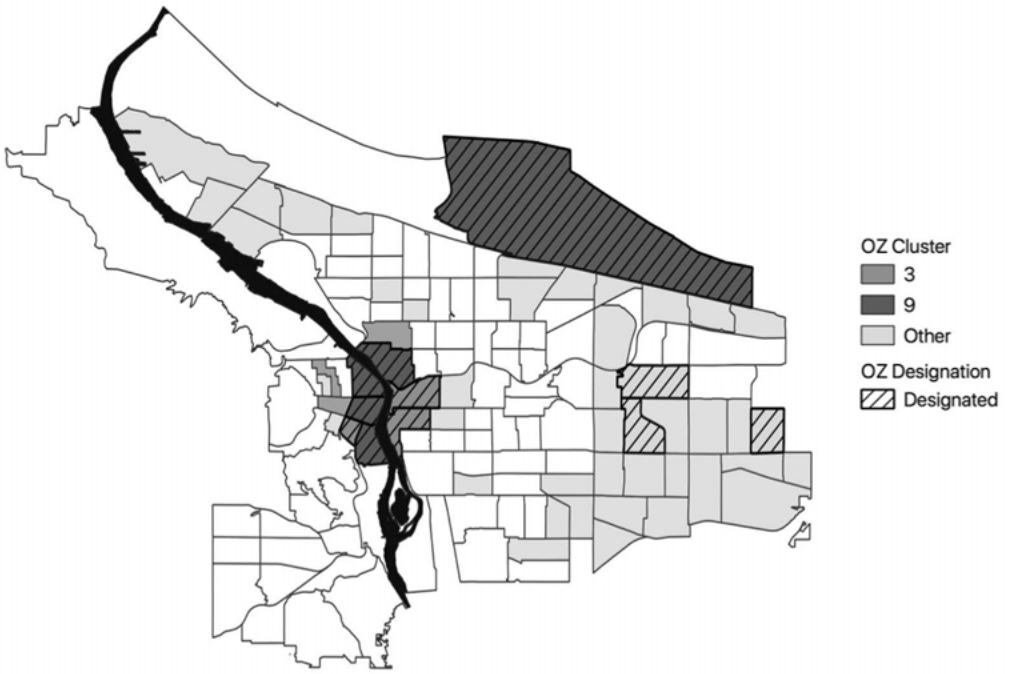


LIC = Low Income Community. OZ = Opportunity Zone.
Source: U.S. Treasury Community Development Financial Institutions Fund

Ultimate OZ designation is not only geographically uneven in Portland, but the tracts that were selected map to the more extreme clusters, particularly clusters 3 and 9. Of the 11 designated OZs, 8, or approximately 73 percent, are in clusters 3 and 9, with 5 of the tracts in cluster 9. Comparing the proportion of eligible tracts to those that were ultimately designated across the nine clusters reveals the story from another perspective. All five eligible tracts in cluster 9 have been designated, and three out of six, or 50 percent, of the eligible tracts in cluster 3 have been designated. Only 3 out of 51, approximately 6 percent, of the eligible tracts in clusters other than 3 and 9 have been designated (exhibit 7).

Exhibit 7

OZ Designations are Uneven Across Portland's Geography



OZ = Opportunity Zone.

Note: It is not possible to track what investment, if any, has gone to the designated tracts in Portland due to data restrictions, but because the majority of the tracts are downtown or in the inner east parts of the city, one knows what investment is likely to flow in that direction, regardless. Recent work tracking such investments shows that investment is flowing into areas that least need additional investment (Kennedy and Wheeler, 2021).

Sources: U.S. Treasury Community Development Financial Institutions Fund; Authors' calculations

Portland serves as an example of the potential for this typology to offer planners a rough geography of investment attractiveness and OZ designation. Portland represents a more extreme case in terms of the zones ultimately designated being heavily concentrated in clusters that are high in terms of investment potential with a relative lack of material deprivation. This typology is based on a national sample of tracts but has clear, rather localized parallels.

Conclusion

To conclude, the authors developed a typology of OZ tracts based on their socioeconomic conditions at the time of designation to better understand what features are associated with designation. Using a combination of the Neighborhood Deprivation Index, the Urban Institute's OZ typology, and the first four principal components of a combination of the Longitudinal Employer-Household Dynamics Origin-Destination (LEHD) jobs data, a nine-cluster typology of tracts using a model-based clustering approach was developed. Clusters 3 and 9 were identified as robust employment centers with relatively low neighborhood deprivation and high investment scores compared with other tracts. Those clusters also had a significantly higher proportion of their eligible tracts designated as OZs compared with other clusters. Using Portland as an example, the

authors found that clusters 3 and 9, concentrated in the downtown and inner east parts of the city, made up a majority of designated tracts at the expense of tracts in the more disinvested eastern part of the city.

What should planners and policymakers take from this? First, the authors hope to offer greater conceptual clarity of the underlying attributes and structure of Opportunity Zones (OZs). Nearly 4 years into the program, a lack of clarity still exists at local levels about what OZs are, what they represent in terms of investment opportunity, and how to take greater advantage of them. This article cannot answer the last two concerns, but it does offer some conceptual clarity as to what OZs can represent. Secondly, this paper strives to introduce model-based clustering to planners and policymakers as an alternative approach for cluster analysis and typology production. Planners, in particular, make extensive use of varied indices and typologies, but they are often simply weighted averages or sums, calling into question their conceptual validity. Model-based clustering allows for a more flexible, defensible, and rigorous approach to clustering in an open-source framework. As government at all levels continues to focus on "data-driven" approaches and making better use of administrative and publicly available data, it is incumbent on practitioners and policymakers to be aware of tools and techniques that can maximize the impact of available information.

Planners and policymakers face a bevy of challenges with Opportunity Zones. The built-in ambiguity of the program has allowed tens of billions of dollars to enter various regions across the country without clear tracking or monitoring until relatively recently. The selection process of designated zones was also highly variable across the country, placing the stated goal of the policy-steering investment into disinvested areas at risk. Underneath those issues, however, lie a set of fundamental conceptual problems. What are the features of some zones that make them attractive for designation, and what are the features that make zones attractive investment opportunities?

Knowing what makes zones attractive for investment is not answerable in a straightforward fashion, especially given the lack of widely available monitoring data. With the newer reporting requirements in place, there is hope the Department of the Treasury will release investment data soon so policymakers can have a better idea of the impact and geography of these investments. Ultimately, what makes a tract attractive for investment—or not—or being designated is an inductive problem that lends itself well to the kinds of exploratory analysis presented here. A cluster analysis of this sort will not and cannot be the final word on the operation of this program, but if policymakers and planners have a structure to better organize tracts, they can better anticipate and design policies to take advantage of OZs. The question of exactly how cities are integrating—or not—OZs with existing economic development policies is an active area of research, and studies such as this one potentially offer one way for planners to better understand the development potential of their local OZs.

The combination of varied machine learning approaches and public data offers immense opportunity for planners and researchers to explore policy problems in novel ways. Cluster analyses are not technologically novel, but making planners and policymakers more aware of these tools and their potential, especially using open-source software, is one way for local governments to embrace the ongoing data revolution. Local authorities have access to a wide array of not only public but also administrative data that can be more fruitfully mined with more experience and

guidance from researchers and technical experts on staff. Investment in human and technical capabilities will be a more significant issue for public authorities as society becomes ever more digitally dependent.

Opportunity zones (OZs) are likely to remain as they are for the life of the program. The program has a variety of issues that make it difficult for local officials, policymakers, and researchers to understand exactly what is going on within zones or, in the case of designation, how they were selected in the first place. Portland's OZs may give one pause in terms of how designation was decided given the immense need in the eastern part of the city compared with its downtown, but there is not a straightforward way to explore what is occuring with these tracts. This paper strives to show model-based clustering with a stylized example of a city that demonstrates to policymakers and planners the usefulness of exploratory data analyses, such as cluster analysis, in examining different features of ongoing policy initiatives and programs.

Acknowledgments

The authors would like to thank Dr. Liming Wang for conceptual and computing support, Jackson Voelkel for assistance in calculating the NDI and Drs. Jordan Purdy and Brian Glass from the State of Oregon Department of Human Services as early readers.

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The Impact of Qualified Opportunity Zones on Existing Single-Family House Prices

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The views expressed are those of the authors and do not necessarily reflect the position of CoreLogic, Inc., or its management.

Abstract

Established by the Tax Cuts and Jobs Act of 2017 (TCJA),[1] qualified Opportunity Zones (OZs) are a new place-based community development program that attempts to help economically challenged areas by encouraging private capital investment through the use of tax incentives. Although the program started at the beginning of 2018, implementation of the program has been slow, creating challenges for investors. The program's structure may have also inadvertently created an environment ripe for surging property prices. This unintended consequence has the potential to reduce or eliminate investor tax benefits, stimulate community gentrification, and diminish affordability for residents. Recent studies have found evidence of material price "premiums" for some commercial real estate properties located in OZs (Pierzak, 2021; Sage, Langen, and Van de Minne, 2019). Recognizing the policy's potential in driving increased investor interest in single-family home rentals, the authors of this study explore the impact of the program on existing single-family house prices and find that the community development program has led to excess home price appreciation totaling 6.8 percent from 2018 to 2020.

[1] "H.R. 1—An Act to provide for reconciliation pursuant to titles II and V of the concurrent resolution on the budget for fiscal year 2018" (Tax Cuts and Jobs Act of 2017). 115th Cong., 1st Sess.

Demand, Supply, and Time Constraints

Taxable investors are naturally drawn to tax incentives. By meeting certain criteria, Opportunity Zone (OZ) investors can defer, reduce, or avoid capital gains taxes. The OZ program offers investment managers an ideal setting for funds with long investment lives and lucrative fee structures. Its required holding periods create "sticky" investor money, and the program offers higher risk-return investment opportunities—for example, heavy renovation, redevelopment, and development—while generating attractive fees. The program also does not have a cap on investment. Not surprisingly, OZs have garnered considerable interest from investors and investment managers. The potential demand for the program is substantial. The Economic Innovation Group estimated that U.S. households and corporations had in excess of $6.1 trillion of unrealized capital gains as of the end of 2017 (Lettieri, 2018). The use of leverage can have a further multiplicative effect on this potential demand.

Although potential demand for this place-based community development program is sizable, the menu of investment opportunities, both in terms of geography and property stock, is more limited. Slightly more than 8,700, or only 12 percent of total, census tracts were designated as OZs. These tracts are generally low-income communities (LICs), meaning areas with poverty rates greater than 20 percent or incomes less than 80 percent of the area's median family income. These largely capital-starved areas often have received few recent, large, or programmatic real estate investments.

With December 31, 2026, set as the last possible day to realize deferred capital gains, investors must acquire an OZ investment before the end of 2021 to meet the 5-year holding period criteria. To satisfy the 7-year holding period, investors had to acquire those investments by the end of 2019. As a result, the extra 5-percent step-up in basis benefit has now expired, and the full tax benefits of the OZ program are no longer available. These time constraints can create a sense of urgency to invest. To the extent that investors value each of the individual step-ups in basis tax benefits, a flurry of investment activity was likely to have occurred in the latter half of 2019; another, perhaps more significant, rush is anticipated in the latter half of 2021. An August 2020 progress report from the White House Council of Economic Advisors indicated that, as of the end of 2019, OZs had attracted $75 billion in capital investment and created more than 500,000 new jobs.

Impact on Single-Family Property Prices

With the potential for significant tax-induced demand, a limited menu of investment opportunities, and mandated time constraints that foster an urgency to invest, the OZ program may have inadvertently created an environment ripe for surging property prices. Recent studies that explored the impact of OZs on commercial real estate prices have found evidence of material price "premiums" for some properties located in OZs. An early study, using Real Capital Analytics data and a repeat sales methodology, found OZ price premiums ranging from 14 to 20 percent for development sites and redevelopment properties, such as apartment, office, industrial, and retail (Sage, Langen, and Van de Minne, 2019). Another study, using CoStar and Urban Institute data, focused on existing market-rate apartments and found OZ price premiums in excess of 20 percent for certain segments of the apartment pool (Pierzak, 2021).

By contrast, limited evidence exists on the impact of OZs on single-family property prices. A National Bureau of Economic Research working paper examined the early effect of qualified OZs on home prices using Federal Housing Finance Authority data (Chen, Glaeser, and Wessel, 2019). It found that OZs have had an insignificant impact on home prices.

This study explores the impact of OZs on existing single-family house prices under the expectation that the policy may similarly attract increased single-family home purchase and investment activity in OZs and place upward pressure on prices. OZ tax benefits apply to investors of single-family homes only if the properties are acquired for investment purposes and meet the OZ program's substantial improvement requirement.[2] Meanwhile, the attractions of community redevelopment and gentrification could also stimulate residential buying activities. This analysis is particularly timely given increased investor interest in single-family home rentals and the surge in home prices during the COVID-19 pandemic.

Transaction Activity

This article explores the state of the single-family housing market in OZs from 2015 to 2020 using the CoreLogic, Inc. public record transaction data. The Urban Institute, a nonprofit economic and social policy research organization based in Washington, D.C., provided data on OZ tract designations. Using the binary variable OZ, the data were split into two groups: designated OZs (OZ=1, Policy Group) and OZ-eligible, non-designated census tracts (OZ=0, Control Group). According to the Urban Institute, 42,176 census tracts were eligible for OZ designation, and 8,762 tracts were designated as OZs (Theodos, Meixell, and Hedman, 2018). The 2010 Census defined a total of 74,134 census tracts in the United States and its territories. The examined timeframe, 2015 through 2020, was also broken down into two intervals: the pre-Tax Cuts and Jobs Act of 2017 (TCJA) (2015 through 2017) and post-TCJA (2018 through 2020) periods. Exhibit 1 displays annual existing single-family house transaction activity by dollar volumes and property counts in designated OZs (OZ=1) and OZ-eligible, non-designated census tracts (OZ=0) from 2015 through 2020. Although the OZ program was not available before 2018, the OZ=1 indicator was used in the pre-TCJA period to identify census tracts that were later to become OZs, allowing for comparisons before and after the legislation.

[2] Acquisitions of existing properties must be "substantially improved" within 30 months of the acquisition to be eligible for OZ tax incentives; this window was suspended from April 1, 2020, through December 31, 2020, due to the pandemic. For example, if an existing single-family home is purchased for $300,000, and values of $200,000 and $100,000 are allocated to the land and improvements, respectively, an investment in excess of $100,000 would be necessary to meet the substantial improvement requirement.

Exhibit 1

Annual Existing Single-Family Home Transactions in Designated Opportunity Zones (OZ=1) and Opportunity Zone-Eligible, Non-Designated Census Tracts (OZ=0), 2015–2020

Period	Transaction Dollar Volume & Percentage Change				Transaction Property Count & Percentage Change			
	OZ=1, Policy Group		OZ=0, Control Group		OZ=1, Policy Group		OZ=0, Control Group	
2015	$46,643,744,318		$315,483,981,358		283,134		1,688,606	
2016	$54,208,366,650	16.2%	$357,242,840,396	13.2%	308,096	8.8%	1,812,636	7.3%
2017	$61,322,405,957	13.1%	$397,475,317,804	11.3%	323,722	5.1%	1,890,972	4.3%
2018	$66,592,061,874	8.6%	$425,398,826,496	7.0%	337,961	4.4%	1,925,365	1.8%
2019	$72,575,396,066	9.0%	$455,455,670,623	7.1%	349,185	3.3%	1,975,464	2.6%
2020	$75,308,831,750	3.8%	$480,669,087,360	5.5%	330,333	-5.4%	1,908,354	-3.4%
Pre-TCJA (2015–2017) Total	$162,174,516,924		$1,070,202,139,557		914,952		5,392,214	
Post-TCJA (2018–2020) Total	$214,476,289,691	32.3%	$1,361,523,584,479	27.2%	1,017,479	11.2%	5,809,183	7.7%

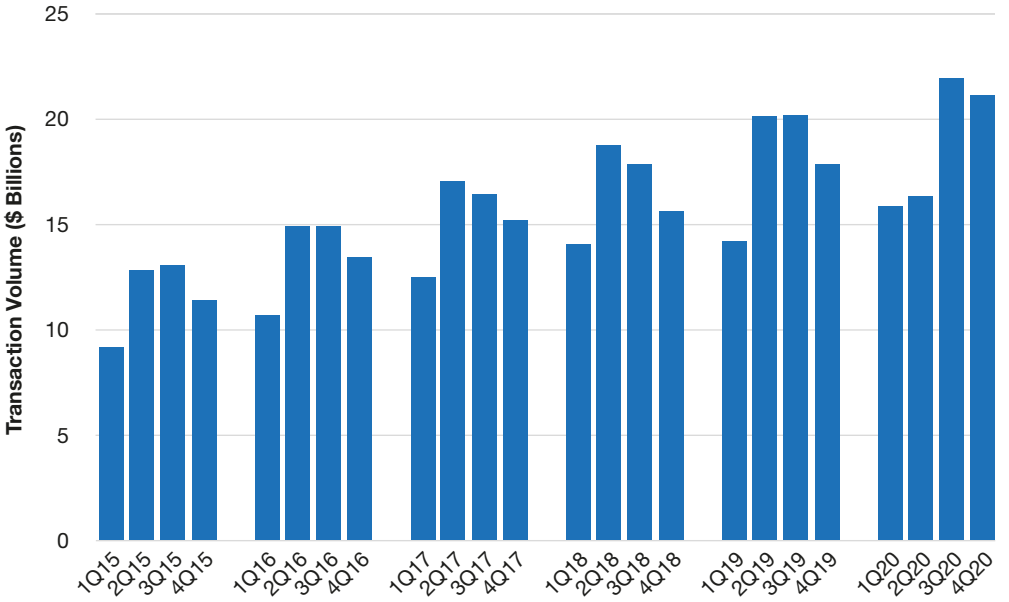
OZ = Opportunity Zone. TCJA = Tax Cuts and Jobs Act of 2017.

Sources: CoreLogic, Inc., as of April 2021; authors' calculations

Transaction dollar volumes for both the policy and control groups increased annually over the examined timeframe, with OZs generally exhibiting greater percentage gains. An interesting finding was that annual percentage gains for both groups were higher in the pre-TCJA period, suggesting a broad trend of increasing prices—albeit at a decreasing rate—from 2015 through 2020. Transaction property counts for both groups also increased on an annual basis through 2019. In 2020, both property count tallies dropped—likely because of the COVID-19 pandemic. In both the pre- and post-TCJA periods, designated OZ transactions accounted for approximately 13 and 15 percent of total transaction dollar volume and property count, respectively. The annual dollar volume and property count data indicate healthy transaction activity in both examined groups during both periods. These single-family housing markets apparently have not suffered from a lack of buyer interest or capital. Examining the annual dollar volume and property count percentage changes, the authors found that the data also showed that both groups followed similar year-over-year trends, suggesting that the implementation of the program did not result in material, non-trend increases in transaction activity for existing single-family homes in Opportunity Zones. Exhibit 2 displays quarterly existing single-family transaction dollar volume for designated OZs (OZ=1) from 2015 through 2020.

Exhibit 2

Quarterly Existing Single-Family Home Transaction Volume in Designated Opportunity Zones (OZ=1), 2015–2020



OZ = Opportunity Zone. 1Q15 = Quarter 1 2015 (and so on).
Sources: CoreLogic, Inc., as of April 2021; authors' calculations

The quarterly data highlight annual trends and seasonality. Annual transaction dollar volume increases were evident from 2015 through 2020. Quarterly trends showed that the second and third quarters of each year typically accounted for the majority of annual transaction activity, with 2020 a notable exception. The muted dollar volume in Quarter 2 of 2020 was likely related to the start of the pandemic-related stay-at-home orders. A flurry of investment activity was anticipated in the latter half of 2019 due to the approaching expiration of the additional 5-percent step-up in basis benefit, but no such rush was evident in the quarterly data. This lack of elevated activity may have been due to the uncertainty surrounding the OZ program's regulations and its slow implementation in 2018 and 2019. It may also reflect a limited investment focus of the examined single-family housing markets.

Exhibit 3 lists existing single-family home transaction dollar volumes and property counts, as well as average sales prices, by state (and Washington, D.C.; hereafter, D.C.) for designated OZs (OZ=1) and OZ-eligible, non-designated census tracts (OZ=0) from 2018 through 2020.

Exhibit 3

Existing Single-Family Home Transactions by State (and D.C.), 2018–2020 (1 of 2)

State	Transaction Volume ($ billions)		Average Transaction Sales Price		Transaction Count	
	OZ=1	OZ=0	OZ=1	OZ=0	OZ=1	OZ=0
CA	$36.618	$226.563	$359,657	$444,743	101,814	509,424
FL	$14.867	$125.355	$174,588	$205,666	85,154	609,509
TX	$13.681	$77.925	$188,052	$212,361	72,751	366,946
NY	$10.449	$54.281	$336,955	$307,596	31,009	176,468
AZ	$9.400	$54.648	$232,111	$236,336	40,497	231,231
CO	$9.159	$52.113	$301,957	$345,655	30,331	150,767
WA	$8.224	$53.648	$306,801	$337,947	26,806	158,746
NC	$8.192	$56.671	$181,405	$211,176	45,161	268,359
VA	$6.692	$36.769	$204,916	$230,152	32,657	159,758
MA	$6.501	$32.522	$339,451	$396,746	19,152	81,972
TN	$5.842	$35.091	$175,005	$185,829	33,384	188,834
NJ	$5.778	$28.348	$258,596	$253,410	22,343	111,866
OR	$5.540	$33.598	$299,549	$311,827	18,495	107,746
MD	$5.353	$26.200	$213,222	$242,405	25,103	108,082
GA	$4.592	$61.725	$149,300	$202,363	30,756	305,022
PA	$4.482	$28.774	$145,284	$162,067	30,853	177,546
MI	$4.093	$22.694	$118,783	$132,793	34,456	170,900
MN	$4.001	$23.500	$172,015	$203,377	23,259	115,550
OH	$3.876	$23.526	$125,106	$129,513	30,984	181,646
IN	$3.263	$15.747	$128,102	$123,119	25,469	127,902
AL	$3.178	$15.106	$150,981	$157,083	21,050	96,166
SC	$3.116	$27.868	$169,598	$213,577	18,370	130,482
UT	$2.982	$19.530	$276,349	$301,154	10,791	64,849
IL	$2.725	$26.015	$122,768	$171,109	22,193	152,038
WI	$2.478	$16.752	$143,971	$158,604	17,210	105,621
MO	$2.412	$16.864	$125,993	$154,985	19,145	108,811
NV	$2.412	$17.630	$216,250	$240,713	11,153	73,239
LA	$2.106	$13.144	$169,620	$180,074	12,415	72,990
KY	$1.856	$12.989	$121,797	$137,584	15,237	94,408
OK	$1.688	$9.894	$138,769	$142,139	12,164	69,608
NM	$1.668	$7.281	$232,889	$206,019	7,162	35,340
AR	$1.446	$10.895	$122,880	$143,354	11,766	76,001
HI	$1.443	$12.806	$525,009	$591,174	2,748	21,662
ID	$1.436	$14.424	$231,310	$263,540	6,210	54,732
NH	$1.325	$7.384	$213,369	$248,720	6,210	29,686
CT	$1.236	$8.222	$197,874	$209,871	6,248	39,175
IA	$1.102	$9.474	$108,633	$142,440	10,146	66,512
RI	$1.065	$3.502	$277,963	$291,609	3,831	12,008

Exhibit 3

Existing Single-Family Home Transactions by State (and D.C.), 2018–2020 (2 of 2)

State	Transaction Volume ($ billions)		Average Transaction Sales Price		Transaction Count	
	OZ=1	OZ=0	OZ=1	OZ=0	OZ=1	OZ=0
DC	$1.054	$8.047	$407,140	$623,961	2,588	12,896
WY	$0.932	$0.893	$233,809	$229,882	3,986	3,884
MS	$0.859	$2.219	$179,691	$152,171	4,779	14,585
VT	$0.782	$2.610	$173,466	$197,491	4,509	13,218
WV	$0.741	$3.584	$151,481	$148,436	4,889	24,145
MT	$0.708	$5.882	$245,579	$289,054	2,882	20,350
NE	$0.659	$4.884	$140,836	$140,208	4,677	34,835
DE	$0.542	$4.282	$164,337	$207,436	3,297	20,641
ME	$0.516	$3.544	$195,317	$225,036	2,640	15,750
KS	$0.513	$3.446	$144,448	$146,350	3,551	23,547
ND	$0.343	$1.003	$146,626	$168,849	2,342	5,938
SD	$0.287	$0.520	$163,341	$151,834	1,757	3,428
AK	$0.267	$1.133	$242,523	$259,556	1,099	4,364
Total	**$214.476**	**$1,361.524**	**$210,792**	**$234,374**	**1,017,479**	**5,809,183**

OZ = Opportunity Zone.

Sources: CoreLogic, Inc., as of April 2021; authors' calculations

A review of the table indicates healthy OZ single-family transaction activity across all states and D.C. from 2018 through 2020. It was highest in California, exceeding $36 billion, and lowest in Alaska, at $267 million. A limited number of states accounted for the majority of OZ single-family transaction volume. Four states—California, Florida, Texas, and New York—had 3-year dollar volumes in excess of $10 billion, accounting for 35.3 percent of the total. Ten states—Arizona, Colorado, Washington, North Carolina, Virginia, Massachusetts, Tennessee, New Jersey, Oregon, and Maryland—had dollar volumes between $5 billion and $10 billion; these states collectively accounted for more than $70 billion in transactions, or an additional 33.0 percent of the total. Just 14 states accounted for more than two-thirds of OZ single-family transaction dollar volume from 2018 through 2020.

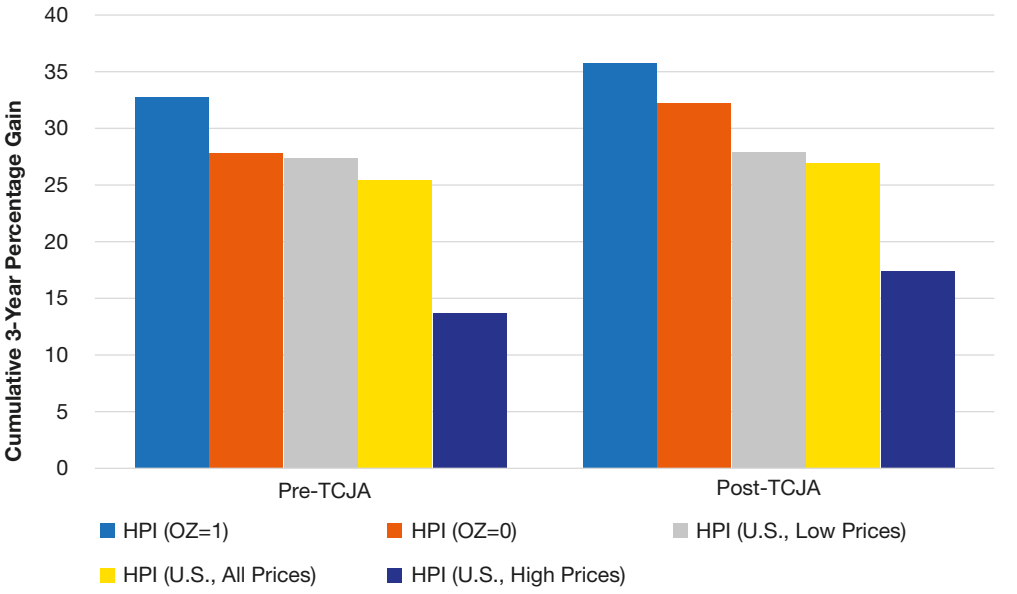
The average transaction sales price highlights the price points for homes in OZs and their non-designated counterparts across the United States. OZs in Hawaii and Iowa had the highest and lowest average sales prices, at $525,009 and $108,633, respectively. Average sales prices exceeded $300,000 in just six states and D.C.; they were below $200,000 in 30 states and below $150,000 in 15 states. An interesting finding was that average OZ sales prices exceeded those in OZ-eligible, non-designated census tracts in nine states: New York, New Jersey, Indiana, New Mexico, Wyoming, Mississippi, West Virginia, Nebraska, and South Dakota.

Repeat Sales Home Price Indices

Using a weighted repeat sales methodology, the authors used CoreLogic, Inc. transaction data to construct the following home price indices (HPIs): designated OZs (HPI [OZ=1]); OZ-eligible, non-designated census tracts (HPI [OZ=0]); U.S. low price (HPI [U.S., Low Price]); U.S. all price (HPI [U.S., All Price]); and U.S. high price (HPI [U.S., High Price]). The national low and high price tiers included transactions that were less than 75 percent and greater than 125 percent of median area home prices, respectively. Exhibit 4 displays cumulative 3-year home price gains for the five HPIs in the pre- and post-TCJA periods.

Exhibit 4

Repeat Sales Home Price Index Cumulative 3-Year Home Price Gains in the Pre-TCJA (2015–2017) and Post-TCJA (2018–2020) Periods



HPI = home price index. OZ = Opportunity Zone. TCJA = Tax Cuts and Jobs Act of 2017.
Sources: CoreLogic, Inc., as of April 2021; authors' calculations

The chart reveals an HPI pecking order among the examined markets, in which the lowest priced segments of the single-family market experienced the largest home price gains; this hierarchy continued in both timeframes. Designated OZs, the segment with the lowest average sales price, experienced the largest 3-year cumulative home price gains; they were 32.8 percent and 35.5 percent in the pre- and post-TCJA periods, respectively. OZ-eligible, non-designated census tracts had the next best performance, followed, in sequence, by the national low price, all price, and high price tiers. Cumulative gains across all HPIs in the post-TCJA period were also larger than their respective gains in the pre-TCJA period, but this outperformance was primarily driven by the surge in home prices across all examined segments in 2020. With these substantial home price gains, the single-family home market has not lacked buyer interest or capital, especially at the lower end of the market.

The spread in cumulative 3-year home price gains between OZs and their OZ-eligible, non-designated counterparts was positive in both timeframes. The spread in the post-TCJA period (3.4 percent) was lower than that of the pre-TCJA period (4.8 percent). The existence of a positive spread before and after the legislation suggests that it did not affect the existing single-family home market in OZs. Although no impact was evident, the implementation of the policy has the potential to add more fuel to already thriving for-sale housing markets in Opportunity Zones.

Data

Urban Institute and CoreLogic, Inc. data were used to explore the impact of OZ designation on existing single-family home prices. The Urban Institute data focused on census tract characteristics and included the following variables:

TractPop	is the census tract's population.
TractMedHHInc	is the median household income within the census tract.
TractLIC	is a dummy variable that equals 1 if the census tract is a low-income community (LIC).
TractGentrif	is a dummy variable that equals 1 if the census tract experienced significant socioeconomic change from 2000 through 2016.[3]
TractBAorHigher	is the census tract's proportion of adults older than age 25 who have a bachelor's degree or higher.
TractOwnerOccup	is the homeownership rate within the census tract.
TractMedRent	is the census tract's median monthly apartment rent.
TractVacRate	is the apartment vacancy rate within the census tract.

The CoreLogic, Inc. data captured market, property, and transaction characteristics. It included the following variables:

MarketHPI	is the property's MSA-level, year-over-year HPI growth.[4]
PropSP	is the property's sale price.
PropGLA	is the gross living area of the property.
PropLotArea	is the lot area of the property.
PropBed	is the property's number of bedrooms.
PropBathFull	is the number of full baths in the property.
PropAge	is the property's age.
PropYrSale2015	is a dummy variable that equals 1 if the property sold in 2015.
PropYrSale2016	is a dummy variable that equals 1 if the property sold in 2016.
PropYrSale2017	is a dummy variable that equals 1 if the property sold in 2017.
PropYrSale2018	is a dummy variable that equals 1 if the property sold in 2018.
PropYrSale2019	is a dummy variable that equals 1 if the property sold in 2019.
PropYrSale2020	is a dummy variable that equals 1 if the property sold in 2020.

[3] The Urban Institute developed this variable of socioeconomic change. Its calculation includes changes in educational attainment, median family income, share of non-Hispanic whites, and housing burden from 2000 to 2016.

[4] If a property was not located in a given metropolitan statistical area (MSA), state-level HPI growth was used instead.

After filtering for missing variables and outliers, the final data sample included 7,108,824 observations covering 50 states, excluding Arizona.[5] Exhibit 5 lists market, census tract, property, and transaction-related variables for existing single-family home sales and provides their descriptive statistics for designated OZs (OZ=1) and OZ-eligible, non-designated census tracts (OZ=0) in the pre- and post-TCJA periods.

Exhibit 5

Descriptive Statistics (1 of 2)

Variable	Pre-TCJA (2015–2017)		Post-TCJA (2018–2020)	
	OZ=1 n=460,326	OZ=0 n=2,954,726	OZ=1 n=511,312	OZ=0 n=3,182,460
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
TractPop	5,047 (2,228)	5,421 (2,821)	4,972 (2,193)	5,423 (2,877)
TractMedHHInc($)	39,290 (11,779)	49,409 (14,222)	38,645 (11,724)	48,824 (14,084)
TractLIC	0.9634 (0.1878)	0.6048 (0.4889)	0.9653 (0.1829)	0.6081 (0.4882)
TractGentrif	0.0312 (0.1738)	0.0195 (0.1383)	0.0278 (0.1645)	0.0182 (0.1335)
TractBAorHigher	0.1859 (0.1153)	0.2385 (0.1363)	0.1813 (0.1118)	0.2336 (0.1327)
TractOwnerOccup	0.5038 (0.1803)	0.6072 (0.1776)	0.5046 (0.1791)	0.6090 (0.1769)
TractMedRent ($/unit/month)	866 (229)	967 (271)	853 (222)	954 (263)
TractVacRate	0.1309 (0.0907)	0.1174 (0.1004)	0.1361 (0.0923)	0.1213 (0.1040)
MarketHPI	0.0566 (0.0284)	0.0574 (0.0281)	0.0560 (0.0267)	0.0568 (0.0267)
PropSP($)	176,372 (153,164)	204,701 (174,955)	212,392 (175,326)	242,135 (193,736)
PropGLA(sf)	1,538 (611)	1,625 (647)	1,522 (610)	1,619 (650)
PropLotArea(Acres)	0.4369 (1.0464)	0.5230 (1.2055)	0.4302 (1.0392)	0.5250 (1.2111)
PropBed	2.9581 (0.8897)	3.0024 (0.8484)	2.9506 (0.8869)	3.0012 (0.8451)
PropBathFull	1.6890 (0.6736)	1.7929 (0.6725)	1.6608 (0.6724)	1.7750 (0.6753)
PropAge(Years)	59.4360 (32.5729)	50.8398 (29.2823)	59.8855 (33.2357)	50.4329 (30.0897)
PropYrSale2015	0.3109 (0.4629)	0.3141 (0.4642)	n/a n/a	n/a n/a
PropYrSale2016	0.3364 (0.4725)	0.3372 (0.4728)	n/a n/a	n/a n/a

[5] In Arizona, public records contain no information on the number of bedrooms or bathrooms in a dwelling.

Exhibit 5

Descriptive Statistics (2 of 2)

Variable	Pre-TCJA (2015–2017)		Post-TCJA (2018–2020)	
	OZ=1 n=460,326	OZ=0 n=2,954,726	OZ=1 n=511,312	OZ=0 n=3,182,460
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
PropYrSale2017	0.3527 (0.4778)	0.3487 (0.4765)	n/a n/a	n/a n/a
PropYrSale2018	n/a n/a	n/a n/a	0.3330 (0.4713)	0.3297 (0.4701)
PropYrSale2019	n/a n/a	n/a n/a	0.3433 (0.4748)	0.3394 (0.4735)
PropYrSale2020	n/a n/a	n/a n/a	0.3237 (0.4679)	0.3309 (0.4705)

n/a = not applicable. OZ = Opportunity Zone. SD = standard deviation. TCJA = Tax Cuts and Jobs Act of 2017.
Sources: CoreLogic, Inc., as of April 2021; Urban Institute, as of December 4, 2018; authors' calculations

By comparing the two groups, the authors discovered some notable differences in the census tract and property variables. The tract-level data showed that OZs were predominantly low-income communities with lower household incomes, lower levels of educational attainment, and lower homeownership rates than their OZ-eligible, non-designated counterparts. More than 96 percent of designated OZ census tracts were low-income communities; approximately 60 percent of non-designated tracts were LICs. OZ median household income was more than $10,000 per year, or approximately 20 percent, lower than that of non-designated tracts. According to the U.S. Census Bureau's Current Population Survey, the percentage of the U.S. population older than 25 years of age with a bachelor's degree or higher was 36.0 percent as of 2019. Reported educational attainment levels in OZs and non-designated tracts were approximately one-half and two-thirds of the current national average, respectively. Homeownership rates were also considerably lower than the national average of nearly 66 percent; OZs had a rate of approximately 50 percent, and non-designated tracts had a rate of roughly 60 percent. OZ apartments also had lower monthly rents and higher vacancy rates. All these measures would seem to indicate that the "right" locations were selected for this new place-based community development program.

From a property perspective, notable differences between the two cohorts included property size, age, and price. Compared with existing single-family homes in non-designated tracts, OZ homes tended to be smaller—in terms of both living and lot area—and older. With an average age of approximately 60 years, OZ single-family home stock is likely ripe for significant renovation or redevelopment. On average, OZ single-family homes were also less expensive compared with the other cohort by 13.8 percent and 12.3 percent in the pre- and post-TCJA periods, respectively.

Empirical Results

Using a difference-in-differences design, the authors examined single-family house price changes in designated OZs during the pre- and post-TCJA periods. The methodology allowed for the calculation of "premiums" for existing single-family homes in designated OZs versus OZ-eligible

census tracts. The dependent variable in the ordinary least squares (OLS) estimation was the natural log of property sales price, lnPropSP. Independent variables included market, census tract, property, and transaction measures. TractPop, TractMedHHInc, TractMedRent, PropGLA, PropLotArea, and PropAge were natural log transformed. In addition, 49 state dummies were included as the class variable. Exhibit 6 displays the OLS regression results for the full sample. The adjusted R^2 for the regression was 48.8 percent, and all the independent variable coefficients were significantly different from zero at the 99-percent level of confidence.

Exhibit 6

OLS Regression Results for Full Sample

Dependent Variable: lnPropSP	Adjusted R^2=0.4878	n=7,108,824	
Independent Variable	**Coefficient**	**Standard Error**	
Constant	-2.9582	0.0125	***
lnTractPop	-0.0657	0.0005	***
lnTractMedHHInc	0.6770	0.0012	***
TractLIC	0.0756	0.0005	***
TractGentrif	0.2713	0.0015	***
TractBAorHigher	0.5020	0.0020	***
TractOwnerOccup	-0.8683	0.0015	***
lnTractMedRent	0.7654	0.0010	***
TractVacRate	-0.3099	0.0022	***
MarketHPI	3.7869	0.0077	***
lnPropGLA	0.4678	0.0008	***
lnPropLotArea	0.0576	0.0002	***
PropBed	-0.0164	0.0003	***
PropBathFull	0.1387	0.0004	***
lnPropAge	-0.0935	0.0003	***
OZ	0.0387	0.0015	***
PropYrSale2015	-0.1192	0.0008	***
PropYrSale2016	-0.0682	0.0008	***
PropYrSale2018	0.0696	0.0007	***
PropYrSale2019	0.1847	0.0008	***
PropYrSale2020	0.2155	0.0007	***
OZ*PropYrSale2015	-0.0180	0.0021	***
OZ*PropYrSale2016	-0.0104	0.0021	***
OZ*PropYrSale2018	0.0142	0.0020	***
OZ*PropYrSale2019	0.0240	0.0020	***
OZ*PropYrSale2020	0.0300	0.0020	***

**** Significantly different from zero at the 99-percent level of confidence.*

OLS = ordinary least square. OZ = Opportunity Zone.

Sources: CoreLogic, Inc., as of April 2021; Urban Institute, as of December 4, 2018; authors' calculations

The variables of most interest in this estimation related to the impact of the policy were the sets of time and OZ*time interaction binary variables. The set of time dummies captured the "base"

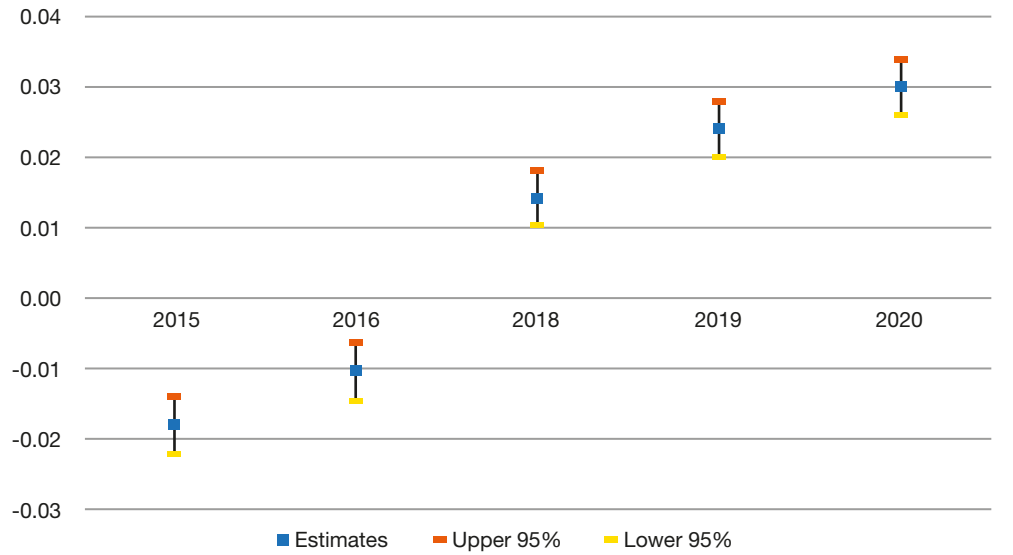
price changes for existing single-family homes in OZ-eligible census tracts. The coefficients for the OZ*time interaction variables captured the policy treatment effect—that is, any additional price changes accruing to existing single-family homes in designated OZs.

PropYrSale2017 and OZ*PropYrSale2017 were omitted from the equation to act as points of reference for their respective series. Percentage differences were calculated by transforming the remaining coefficients. The strength of the single-family market in OZ-eligible tracts was evident throughout the examined timeframe. All else being equal, the sales price is expected to be 11.2 percent lower in 2015 compared with 2017 for existing single-family homes in OZ-eligible census tracts. It is expected to be 24.0 percent higher for a property that sold in 2020 compared with 2017. Again, the OZ-eligible census tracts appear to have not suffered from a dearth of buyer interest or capital for single-family homes.

The results from the OZ*time interaction variables suggest that the OZ policy influenced existing single-family home prices. Exhibit 7 displays a visual of the evolution of the policy parameters. Before becoming OZs, those low-income communities' home price growth trailed behind the control group by 1.8 percent in 2015 and 1.0 percent in 2016. Afterward, the OZ tracts outperformed the control group and led in additional home price appreciation by 1.4 percent in 2018, 2.4 percent in 2019, and 3.0 percent in 2020. Cumulatively, OZ tracts led the control group with a 6.8-percent increment in home price appreciation. The modest discounts in the pre-TCJA period and moderate premiums in the post-TCJA period indicate that the policy has had an economically meaningful impact on existing single-family house prices in Opportunity Zones.

Exhibit 7

Difference-in-Differences Estimates of the OZ*Time Interaction Variables with 95-Percent Confidence Intervals



OZ = Opportunity Zone.

Sources: CoreLogic, Inc., as of April 2021; Urban Institute, as of December 4, 2018; authors' calculations

Next, to examine whether the price gains could more or less have accrued to properties acquired for investment purposes, the authors partitioned the data by age. Investment-related renovation and redevelopment activities are more likely for older properties, so investor purchases could conceivably be more concentrated in older homes. If true, it will result in a larger premium accruing to older homes in the OZ tracts. By contrast, relatively newer homes are anticipated to possess a smaller proportion of investment homes and so have a smaller OZ premium. The median property age was about 50 years and was used to divide the full sample into two groups. Exhibit 8 displays the OLS regression results for the age subsamples.

Exhibit 8

OLS Regression Results for Age Subsamples

	Dependent Variable: lnPropSP Age ≤ 50 Adjusted R^2=0.4899 n=3,693,692			Dependent Variable: lnPropSP Age > 50 Adjusted R^2=0.5034 n=3,415,132		
Independent Variable	**Coefficient**	**Standard Error**		**Coefficient**	**Standard Error**	
Constant	-0.6394	0.0143	***	-5.0261	0.0206	***
lnTractPop	-0.1467	0.0006	***	0.0586	0.0009	***
lnTractMedHHInc	0.5380	0.0014	***	0.7756	0.0020	***
TractLIC	0.0742	0.0006	***	0.0344	0.0009	***
TractGentrif	0.2251	0.0019	***	0.2795	0.0022	***
TractBAorHigher	0.3928	0.0024	***	0.5845	0.0030	***
TractOwnerOccup	-0.6463	0.0017	***	-1.2102	0.0026	***
lnTractMedRent	0.5785	0.0012	***	0.9642	0.0016	***
TractVacRate	0.0254	0.0023	***	-0.9063	0.0043	***
MarketHPI	2.8487	0.0089	***	4.4523	0.0122	***
lnPropGLA	0.6187	0.0009	***	0.3621	0.0013	***
lnPropLotArea	0.0364	0.0002	***	0.0500	0.0004	***
PropBed	-0.0064	0.0004	***	-0.0288	0.0004	***
PropBathFull	0.1041	0.0005	***	0.1651	0.0006	***
lnPropAge	-0.1098	0.0004	***	-0.1805	0.0014	***
PropYrSale2015	-0.1262	0.0009	***	-0.1110	0.0012	***
PropYrSale2016	-0.0689	0.0009	***	-0.0665	0.0012	***
PropYrSale2018	0.0619	0.0009	***	0.0792	0.0012	***
PropYrSale2019	0.1597	0.0009	***	0.2065	0.0012	***
PropYrSale2020	0.1958	0.0008	***	0.2340	0.0012	***
OZ	0.0450	0.0019	***	0.0363	0.0021	***
OZ*PropYrSale2015	-0.0094	0.0027	***	-0.0298	0.0031	***
OZ*PropYrSale2016	-0.0038	0.0026		-0.0158	0.0030	***
OZ*PropYrSale2018	0.0116	0.0026	***	0.0148	0.0029	***
OZ*PropYrSale2019	0.0185	0.0026	***	0.0281	0.0029	***
OZ*PropYrSale2020	0.0151	0.0026	***	0.0396	0.0029	***

*** Significantly different from zero at the 99-percent level of confidence

OLS = ordinary least squares. OZ = Opportunity Zone.

Sources: CoreLogic, Inc., as of April 2021; Urban Institute, as of 12/4/18; authors' calculations

As expected, the transformation of the OZ*PropYrSale2020 coefficient in the younger subsample yielded an OZ premium of 1.5 percent, less than that of the full sample. In the older subsample, the premium for OZ homes related to OZ*PropYrSale2020 was 4.0 percent, compared with 3.0 percent for the full sample. When the sample was limited to existing single-family homes older than 75 years, the same premium rose to 4.8 percent.[6] These elevated premiums are consistent with the authors' conjecture that older single-family properties were more likely candidates for investment activity. They also further confirm that the OZ policy has had an economically meaningful impact on single-family home prices.

Conclusions

Although the intent of the OZ policy is to encourage private investment into capital-starved areas, existing single-family homes in designated OZs and OZ-eligible, non-designated census tracts have not lacked buyer interest or capital. Transaction activity by dollar volume and property count in both groups was healthy in the pre- and post-TCJA periods. Repeat sales home price indices showed considerable strength in home prices in the years before and after the legislation. Designated OZs, the lowest priced segment of the examined groups, posted the highest annualized home price gains in both the pre- and post-TCJA periods.

This analysis indicates that the OZ policy has had an economically meaningful impact on single-family house prices. Before their designation as qualified Opportunity Zones, these low-income communities showed lagging home price appreciation rates. In the 3 years after becoming OZs, however, the gaps were eliminated and reversed. This study also found evidence consistent with greater demand for older single-family houses as they likely attracted more investor interest and buying activities. Planned future research will investigate this further. The OZ policy has the potential to even further fuel the significant existing home price gains experienced in qualified Opportunity Zones.

Acknowledgments

The authors thank the Urban Institute and Frank Nothaft of CoreLogic, Inc., for graciously providing the data for this study.

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[6] OLS regression results for this estimation are available from the authors upon request.

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Gentrification and Opportunity Zones: A Study of 100 Most Populous Cities with D.C. as a Case Study

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Abstract

This article explores the role of gentrification in the selection of Opportunity Zone (OZ) census tracts, as well as the potential impact of OZ on gentrification in the 100 most populous urban areas in the United States and in Washington, D.C. It analyzes the role of gentrification in the selection of OZ census tracts in 100 core-based statistical areas (CBSAs). A CBSA is a geographic area defined in terms of counties, which consists of an urban area of at least 10,000 population and its surrounding socially and economically integrated areas. Next, we test whether gentrification has differential impacts on economic activity in OZ and non-OZ neighborhoods in the 100 most populous metropolitan areas. If so, we then use the District of Columbia (D.C.) as a case study to analyze the impact of gentrification on migration in D.C. and predict the impact of economic activity in OZ-eligible neighborhoods. We construct an education-based gentrification measure to analyze the relationship between OZs and gentrification in CBSAs. Our descriptive analysis of the 100 most populous urban areas in the United States (100 CBSAs) indicates that, although it appears that gentrified census tracts were not favored to receive OZ designation, the statistical relationships between gentrification and business and residential vacancy rates are stronger in OZ-designated tracts. In D.C., we find that gentrification has been spreading to more neighborhoods in OZ eligible neighborhoods. Using administrative data from the D.C. government, we find that in-migration rates of higher income residents are significantly higher compared to their out-migration rates.

We examine OZ eligible census tracts to understand the expected destination of new investment, measured as the number of permits, and find that census tracts with positive net migration and lower business vacancy rates are likely to receive increased financing.

Introduction

Opportunity Zones can potentially cause or speed up gentrification in many urban areas of the United States.[1] Through this program, the federal government creates tax incentives for investments in new businesses and commercial projects in the census tracts that received Opportunity Zone (OZ) designation. Eligibility criteria for OZ designation was broadly set by the federal government during the creation of the program, and state governors and local politicians were given the authority to select which census tracts to designate as Opportunity Zones from the range of census tracts that met OZ designation criteria. For instance, in Washington, D.C., out of 97 low-income communities and 19 contiguous census tracts, 25 of them received OZ designation.[2]

The rules and regulations of the Opportunity Zone program are flexible (Marcin, 2020), and, consequently, state governors and local political leaders could influence the selection process. The OZ program's main objective has been to attract more economic development to distressed neighborhoods, but due to the broad and flexible rules, more than one-half (about 57 percent) of all census tracts nationwide meet the eligibility criteria for OZ designation (Gelfond and Looney, 2018). Therefore, the gentrifying lower-income census tracts that meet the eligibility criteria could receive Opportunity Zone designation through lobbying efforts by developers and their supporters in local governments. These census tracts are expected to receive more private investments than those located in non-gentrifying tracts. Gentrification, the replacement of low-income and less-educated population groups with those of higher socio-economic status, has been associated with higher returns for investments in businesses and real estate (Brummet and Reed, 2020).

Place-based policies such as OZ are generally evaluated with respect to their effects on property and labor markets. While the OZ program is still new, there is already research examining its impact on residential and commercial property values (Alm, Dronyk-Trosper, and Larkin, 2021; Chen, Glaeser, and Wessel, 2020; Sage, Langen, and van de Minne, 2021), as well as employment and earnings (Arefeva et al., 2021; Atkins et al., 2021; Freedman, Khanna, and Neumark, 2021). This article considers the role of gentrification and how the in-migration and out-migration of higher income residents and lower income incumbent residents, respectively, can potentially attract more investments in some OZ census tracts. Specifically, this article attempts to explore the role of gentrification in the selection of OZ census tracts using business and residential vacancy rates (as indicators of the level of economic activity) in the 100 most populous urban areas in the United States and D.C. as a case study. Core-based statistical area (CBSA) is a collective term for metropolitan and micropolitan statistical areas. These geographic areas are defined in terms of whole counties (or county equivalents) and consists of an urban core of at least 10,000 population and its surrounding socially and economically integrated areas.[3] Finally, we use Home Mortgage Disclosure Act (HMDA) data to study how gentrification affects the trend among potential homebuyers by racial group.

[1] https://www.brookings.edu/blog/up-front/2018/02/26/will-opportunity-zones-help-distressed-residents-or-be-a-tax-cut-for-gentrification/.

[2] See https://dmped.dc.gov/page/how-dc-designated-our-opportunity-zones for information on OZ designation in D.C.

[3] https://www.census.gov/glossary/#term_CoreBasedStatisticalAreasCBSAs

Following Card, Mas, and Rothstein (2008) and Brummet and Reed (2020), we first construct a gentrification measure for all central city census tracts in the 100 most populous urban areas in the United States. Then, we develop an empirical model to study the role of gentrification in OZ designation. Identifying census tracts as gentrifying and non-gentrifying has not been free of problems (Ding, Hwang, and Divringi, 2016; Otabor, Kurban, and Schmutz, 2020). Without having access to finer geographic-level data on the in-migration rate of the higher income population and the out-migration rate of the lower income population, it is not possible to accurately measure the displacement impacts of gentrification (Hwang, 2015). A recent study (Otabor, Kurban, and Schmutz, 2020) used address-level income and real property tax data from the D.C. government to study within-city migration. Similarly, we use D.C. administrative data to analyze the relationship between gentrification and migration patterns of the 116 census tracts that met OZ eligibility criteria. If gentrification played a role in receiving OZ designation, these census tracts would be expected to receive a higher share of subsidized investments.

Information on business and residential vacancy rates allows us to compare census tracts in terms of their economic potential to attract new businesses and residents. Lower business vacancy rates indicate that neighborhoods are attracting more new businesses. These new investments could be partially driven by gentrification as businesses respond to the increasing demand for new goods and services set in motion by the inflow of higher income residents. Our descriptive analysis of the 100 most populous urban areas in the United States (100 CBSAs) indicates that, although it appears that gentrified census tracts were not favored to receive OZ designation, the statistical relationships between gentrification and business and residential vacancy rates are stronger in OZ designated tracts. In D.C., we found that gentrification has been spreading to more neighborhoods in OZ-eligible tracts, and this process is mostly driven by an influx of higher income residents and an outflow of lower income residents. The in-migration rates of higher income residents are significantly higher compared to their out-migration rates, which caused displacement of the lower income residents. Having access to administrative data from the D.C. government allows us to directly measure the year-to-year pace of gentrification in OZ-designated census tracts. The empirical model of this study can be extended to other metropolitan areas once data are available.

Literature Review

Place-based development policies use tax incentives to spur economic growth. Such policies have been implemented at the federal level, as well as within and across states. The OZ program is still in its infancy, and the long-term impact of the program is still unfolding. Several recent studies have sought to capture early signals of the type of effect this designation is anticipated to have on various outcomes of interest.

One area that has garnered much attention is the property market. Chen, Glaeser, and Wessel (2020) estimated the effect of OZ designation on housing prices using data from the Federal Housing Finance Agency (FHFA) and the Urban Institute. The authors first use a simple difference-in-differences approach, then a propensity-score weighted version of the difference-in-differences approach to compare OZ designated tracts with eligible, non-designated tracts. Their third approach compares OZ designated tracts with bordering areas. All three approaches point

to a small and statistically insignificant effect of OZ designation on residential property prices. While they emphasize the preliminary nature of their findings given the recency of the policy implementation, they do not find evidence of expectation among homebuyers of neighborhood upgrading. They conclude by questioning the effectiveness of capital subsidies versus "investments in human capital and neighborhood amenities" as the way forward for eligible tracts.

Sage, Langen, and van de Minne (2021) examined the effect of OZ designation on property values, using a difference-in-differences framework to compare OZ designated census tracts with eligible (but not designated) tracts. They posited that higher property values should be the result of a successful OZ program. On the contrary, the authors found that in general, OZ designation did not impact prices. They found, however, an increase in prices for properties with high redevelopment or renovation requirements and for vacant land. From these findings, the authors concluded that "tax benefits are priced in, but investors anticipate limited future economic growth of OZ census tracts."

Alm, Dronyk-Trosper, and Larkin (2021) focused on Florida data for the period 2016 to 2020 to estimate the impact of OZ designation on both residential and business real estate prices. They employed different ordinary least squares (OLS) methods and fuzzy regression discontinuity, all of which suggest a negligible impact on both of their measures of economic development. They found that the effect on non-vacant residential property values is positive, whereas the impact on commercial and vacant property is unclear.

The designation process for OZ status has also sparked interest due to the broad discretion state governors have in selecting tracts for designation among the OZ eligible tracts. The cause for concern is enabled by the lack of meaningful oversight on the governors in their decisionmaking. Eldar and Garber (2021) evaluated the extent to which favoritism was exercised in OZ designation, using two different proxies for favoritism. They found a 5 percent greater likelihood of selection for tracts in counties which exhibited strong support for the governor in the last election. This study further found a 6.4 to 13.3 percent larger probability of OZ designation associated with campaign contributions by investors. Their findings suggest that the OZ designation process was in fact influenced by the governors' desire (and ability, through the OZ program design) to reward supporters. Results from using a matching technique support the initial findings that favoritism played a material role in designation. In comparing the relative importance of favoritism as against economic distress in the governors' OZ selection decisions, the authors argued that favoritism allowed 10 percent of the tracts to be selected, whereas these tracts would not have been selected otherwise. Additionally, about 20 percent of the OZ designations would have been assigned to other tracts which have higher rates of distress when assessed on the variables of income, poverty, and unemployment. Furthermore, their analysis suggests that favoritism toward investors was a stronger determining factor compared to rewarding voter support.

Frank, Hoopes, and Lester (2020) studied the role of political affiliation using a linear probability model with state-fixed effects as a baseline model, adding indicator variables to estimate the partial effects of the variables of interest. They found a 7.6 percent greater likelihood of designation if the census tract's state representative has the same political party affiliation as the governor. They also studied various state-level information channels used by governors in their selection process. They

found that the channel used is a strong determinant of the increased likelihood of designation, which ranges from 0.0 percent to 25.6 percent, depending on the channel.

This article contributes to the early literature studying the economic effects of OZs. It differs from other studies in that it evaluates the extent that gentrification, which has links to property prices and has been seen to be affected by public policies, played a role in the decisionmaking process for OZ designation. The intuition behind this inquiry stems from the fact that gentrifying tracts tend to have a stronger potential for economic growth and thus could be expected to deliver better economic returns relative to comparable non-gentrifying tracts. As such, from the standpoint of policymakers, it may appear more pragmatic to select a gentrifying census tract as opposed to a tract in greater economic distress that may not attract investors precisely due to the level of its distress.

This article also contributes to the literature on gentrification. Gentrification literature has seen a renewed interest in, and a broadening of, factors deemed causal in the process of gentrification (Hwang and Lin, 2016). One such factor is the effect of public policy. To what extent has public policy sparked, intensified, or mitigated the gentrification process? Another strand of the gentrification literature examines the racial aspects and effects of gentrification, whereby those moving in tend to be primarily white and those moving out tend to be minority, with a focus on African-Americans. While the gentrification literature is over 50 years old, there is still no consensus on a definition. Broadly, the idea revolves around neighborhood change from working class to middle class, associated with an influx of migrants of a higher socio-economic class. Variables used to capture this change include changes in income, rent, home value, or education profile. This article draws from the gentrification measure used by Brummet and Reed (2020).

Brummet and Reed (2020) used longitudinal microdata to study the impact of gentrification on the well-being of original residents. Based on work by Baum-Snow and Hartley (2019) and Couture and Handbury (2019), they operationally defined gentrification as "an increase in college-educated individuals' demand for housing in initially low-income, central city neighborhoods." They demonstrated that this measure of gentrification performs as well as other commonly used measures such as change in income, rent, and house value. Brummet and Reed (2020) pointed to the following benefits of the education variable: (1) easier separation of cause and effect, given the relative stability of college attainment after age 25; (2) prior use of this variable in studying tipping (Böhlmark and Willén, 2020; Card, Mas, and Rothstein, 2008); (3) early detection possibility, given that changes in education may be a precursor to changes in rent and income; and (4) the recent "return to the city" has been driven by college educated individuals (Baum-Snow and Hartley, 2019; Couture and Handbury, 2019; Edlund, Machado, and Sviatschi, 2019; Su, 2019).

In addition to the effects on new and incumbent residents, there is interest in the effect on the changing neighborhoods. Gentrification is associated with higher incomes, and thus, greater levels of disposable income. While higher levels of disposable income can be thought of as generally positive for businesses, Meltzer's (2016) exploration of the effect of gentrification on small businesses found mixed results. On the one hand, she did not find higher levels of displacement in gentrifying neighborhoods, as compared with their non-gentrifying counterparts. Conditional on a business leaving, however, the length of vacancy is longer for gentrifying as compared with non-

gentrifying neighborhoods. She noted that "cities with less vibrant neighborhood retail markets could be more vulnerable to gentrification-induced displacement."

Our study aligns with Neumark and Simpson's (2015) suggestion[4] for extending the evidence base with respect to place-based policy. In this article, we also seek to predict the investment flow across OZ tracts and understand whether gentrifying tracts are predicted to capture more of the business investment, thus giving initial insight into potential redistribution effects due to inclusion of gentrifying tracts.

The Opportunity Zone Selection Process

Overall, 42,078 of the 73,070 census tracts in the United States were eligible for OZ status, of which 8,687 received the OZ designation (Urban Institute). The Internal Revenue Service (IRS) lists two categories of tracts eligible for OZ designation, namely Low-Income Communities (LICs),[5] and eligible non-LIC contiguous tracts.[6] In selecting tracts for OZ designation, states prioritized LIC tracts.[7] This is evidenced by 97.2 percent of OZ-designated tracts being LICs compared to 69.9 percent of eligible non-designated tracts being LICs. Although OZ-designated tracts had a much higher share of LICs compared to the share of LICs in eligible non-OZ-designated tracts, analysis shows that many of the tracts selected for designation did not need the additional subsidy to attract new investment. That is, there were other LIC tracts more in need of the designation than those selected (Gelfond and Looney, 2018). Thus, while the OZ program aims to spur economic activity in distressed areas, the impact of OZ designation may be affected by poor geographic targeting.

Under the definition of LIC, 97 census tracts within D.C. were eligible to be designated as OZs. Based on the conditions for tracts contiguous with LICs to be designated as OZs, 19 additional census tracts were potentially eligible.[8] In total, 116 census tracts in D.C. were potentially OZ eligible. Of these, 25 tracts were designated as OZ, which corresponds to the maximum number of tracts that D.C. could nominate.[9] Summary data made available by the Urban Institute[10] compares D.C.'s OZ-designated tracts with the eligible, non-designated tracts and all tracts within D.C.

[4] Neumark and Simpson (2015) reviewed the literature on place-based policies and made recommendations for going forward.

[5] Broadly, an LIC either has a poverty rate of at least 20 percent, or the median family income is less than or equal to 80 percent of the statewide or metropolitan area median family income. The definition of LIC used for OZ determination is codified in §45D(e) of the IRS Code. See 26 USC 45D: New markets tax credit (house.gov).

[6] Non-LIC tracts are eligible for OZ designation if they are contiguous with (if they share a common border with) an OZ designated tract, and the median family income of the contiguous tract is not greater than 125 percent of the median family income of the OZ designated tract. Both these conditions must be met for the contiguous tract to be eligible for OZ designation. See also Microsoft Word - rp-18-16.docx (irs.gov). Note that the IRS does not require the contiguous tract to be in the same state as the OZ-designated tract.

[7] Both LICs and eligible contiguous tracts are eligible to receive OZ designation. Only those eligible tracts which are nominated by a state, the District of Columbia, or a U.S. territory, and which are subsequently certified "by the Secretary of the U.S. Treasury via his delegation of authority to the Internal Revenue Service (IRS)," receive the designation of Qualified Opportunity Zone (QOZ or OZ), however.

[8] https://www.cdfifund.gov/sites/cdfi/files/documents/ozone-information-resource.2.27.18-locked2.xlsb

[9] The OZ regulation instructs states to designate either 25 percent of all LICs census tracts or 25 census tracts if the state has fewer than 100 LICs.

[10] See Theodos, Meixell, and Hedman (2018), which provides a link to state-level tract characteristics by Opportunity Zone designation status at https://www.urban.org/sites/default/files/urban_statesozs_update.xlsx.

Across the economic, housing, demographic, education, and socioeconomic change characteristics compared, there exists an expected pattern with designated OZs having the lowest values on characteristics associated with positive neighborhood characteristics (such as median household income and median home value), followed by non-designated eligible tracts, and then all tracts within D.C. Conversely, designated OZ tracts had the highest values on characteristics associated with negative neighborhood characteristics (such as poverty rate and unemployment rate).

OZ designation incentivizes new investments to the selected census tracts with reductions in federal capital gains tax. OZ designation could potentially have positive social and economic impacts on low-income and undercapitalized census tracts. At the same time, heterogeneity among residents of these areas suggests differential effects on them. The flow of investment toward OZs can positively influence neighborhood amenities, which may increase rents and housing prices, and thus, gentrification. On the other hand, given the choice between gentrifying and non-gentrifying OZ tracts, a gentrifying OZ may present a more attractive option for the investor given the comparison between the expected rate of return on investments. Indeed, in a Brookings blog post, Looney (2018) posed the question "Will Opportunity Zones help distressed residents or be a tax cut for gentrification?"[11]

In addition to federal capital gain tax incentives, the D.C. government also provides capital gain tax benefits for qualified investments. To receive D.C. OZ capital gain tax incentives, a proposed project needs to meet one of four criteria:[12] (1) it invests in one of the projects selected by D.C.; (2) it receives support from an Advisory Neighborhood Commissioner (ANC) that represents one of the OZ neighborhoods; (3) it falls into one of the projects in the District Portfolio Project; and (4) it receives a 75 or higher score from the Urban Institute's Community Impact Assessment Tool. Through these local incentives, the D.C. government tries to direct additional OZ investments to support its economic policy priorities.

Data and Methods

Gentrification, originally conceptualized by Glass (1964) as the replacement of the working class by the middle class, has been measured using increases in education levels, household incomes, rents, and housing prices. Following Card, Mas, and Rothstein (2008) and Brummet and Reed (2020), we use the change in the percentage of college graduates in a census tract between two time periods as our measure of gentrification. Specifically, the gentrification measure is calculated as the change from time t to t+1 in the number of individuals aged 25 or older with a bachelor's degree or higher living in census tract j in city c, divided by the total population aged 25 or older living in tract j and city c in year t:

[11] Adam Looney, "Will Opportunity Zones Help Distressed Residents or Be a Tax Cut for Gentrification?" Up Front (blog), Brookings Institution, February 26, 2018, https://www.brookings.edu/blog/up-front/2018/02/26/will-opportunity-zones-help-distressed-residents-or-be-a-tax-cut-for-gentrification/.

[12] https://dmped.dc.gov/page/opportunity-zones-washington-dc.

$$gent_{jc} \equiv \frac{bachelors25_{jc,t+1} - bachelors25_{jc,t}}{total25_{jc,t}} \quad (1)$$

The more recent wave of gentrification has been characterized by the flow of young college graduates to lower income neighborhoods. As such, this measure detects earlier stages of neighborhood changes and improvements in neighborhood amenities (Brummet and Reed, 2020).

The education and population variables used to calculate the gentrification measure are from the American Community Survey (ACS) 5-year estimates. Additional characteristics of the census tracts used in the analysis of the 100 most populous CBSAs are also from this source. For the case study on D.C., income, home value, and migration characteristics are sourced from the D.C. government's individual income tax and real property tax administrative records. The other D.C. data points are retrieved from the ACS.

Gentrifying and gentrified neighborhoods attract higher-income residents, and therefore are associated with higher levels of median household income. Because of the increased purchasing power or disposable income, the neighborhoods at the various stages of gentrification are more attractive to many businesses than non-gentrifying ones. We use residential and business vacancy data from the U.S. Postal Service (USPS) as a proxy for business attractiveness. This measure is used to predict where the new OZ investments will flow. Vacancy data for businesses and residents are collected by USPS and aggregated by the U.S. Department of Housing and Urban Development (HUD) to provide quarterly information on census tract-level vacancies for various time intervals, with durations varying from 3 to 36 months or longer (HUD, 2016).[13] This data will be referred to as USPS-HUD throughout this article. Additionally, based on the notion that household investment is a precursor to nonresidential business fixed investment (Fisher, 2007), we use building permit data as a proxy in predicting the flow of new business investments in our D.C. analysis. Specifically, we use the change in construction permits over the period 2011 to 2015. Permit data are retrieved from the D.C. government's open data website.[14]

Additionally, we use mortgage loan data from the Home Mortgage Disclosure Act (HMDA) for the period 2007–19. These data provide the number and value of loans originated and is disaggregated to examine the distribution of home buyers by race.

Our contribution is three-fold. First, we explore the role of gentrification in OZ-designated census tracts. Second, we use USPS-HUD vacancy data to predict the flow of new business investments across OZ census tracts. Additionally, following Brummet and Reed (2020), we use longitudinal microdata from the D.C. government, specifically the individual income and real property data, to explore neighborhood change in D.C. between 2011 and 2015. Annual in- and out-migration and demographic data for all D.C. residents allow us to observe gentrification, in-migration of higher income residents, and displacement of the lower income population throughout the city.

[13] The USPS identifies a vacant address as one to which mail has not been delivered for more than 3 months (GAO, 2011). In HUD-USPS data, long-term vacant and inhabitable addresses are labeled as "no stat". They may reflect either the units under construction or those demolished or abandoned. To avoid measurement errors, we exclude "no stat" addresses from our vacancy counts.

[14] https://opendata.dc.gov/search?q=building%20permits

The following three exhibits provide categorized summary data on the relationship between gentrification and Opportunity Zone status for the CBSAs, and for D.C. Exhibit 1 shows the unweighted[15] mean gentrification score, as well as its frequency and percent of the distribution, for census tracts within the 100 CBSAs, categorized based on their status as eligible, non-designated census tracts or as OZ designated census tracts. Overall, the mean gentrification score[16] of the 100 CBSAs is 1.83. On average, OZ-designated census tracts have a lower mean gentrification score compared to their eligible, non-designated counterparts (1.49 compared to 1.91). These OZ census tracts account for 3,693 (18.95 percent) of the total census tracts studied.

Using the average gentrification score (1.83) as a proxy for the average national gentrification score, three categories are identified within the gentrification measure. Exhibit 2 shows the percentage breakdown into these categories for each of the two Opportunity Zone statuses. The stagnant or negative trend is made up of census tracts with a negative or zero gentrification score. The below-average trend comprises census tracts with a positive gentrification score below the national average. Because the gentrification scores of the stagnant or negative trend, and the below-average trend are less than the national average, we classify these tracts as non-gentrifying. Tracts that make up the above-average trend are classified as gentrifying because they consist of tracts with a gentrification higher than the national average. Compared to non-designated census tracts, OZs had a higher percentage of tracts classified as stagnant or negative trend (48.01 percent compared to 42.86 percent). Compared to non-designated census tracts, however, OZs had a lower percentage of tracts classified as below-average trend (25.94 percent compared to 27.92 percent) as well as a lower percentage classified as above-average trend (26.05 percent compared to 29.22 percent).

Exhibit 1

CBSA Gentrification by Opportunity Zone Status

Opportunity Zone Status	Mean	Frequency	Percent
Eligible, Non-Designated	1.91 (10.14)	15,794	81.05
Designated Opportunity Zone	1.49 (4.31)	3,693	18.95
Total	1.83	19,487	100

CBSA = core-based statistical area.

Source: Authors' calculation from American Community Survey and Internal Revenue Service data

[15] Each census tract is given the same weight. Oversampling is not an issue.

[16] Because our gentrification measure is based on the change in percentage of a tract's population which is 25 and older with a college degree, the category titles refer to the direction of the change.

Exhibit 2

CBSA Opportunity Zone Status by Gentrification Category

	Opportunity Zone Status		
Gentrification Measure Category	Eligible, Non-Designated (%)	Designated OZ (%)	Total (%)
Stagnant or Negative Trend	42.86	48.01	43.84
Below-Average Trend	27.92	25.94	27.54
Above-Average Trend	29.22	26.05	28.62
Total	100.00	100.00	100.00

CBSA = core-based stastistical area. OZ = Opportunity Zone.

Notes: Average is calculated for the 100 most populous CBSAs. Stagnant or Negative Trend refers to those losing college educated population; Below-Average Trend refers to those increasing college educated population at a rate below the 100 CBSA trend; Above-Average Trend refers to those increasing college educated population above the trend such as to be classified as gentrifying.

Source: Authors' calculation from American Community Survey and Internal Revenue Service data

Exhibit 3 replicates exhibit 2, but for Washington, D.C., using the city's mean gentrification score (1.95). Similar to the CBSAs, OZ tracts in D.C. have a lower percentage of tracts that are gentrifying compared to eligible, non-designated tracts (27 percent compared to 45.88 percent). Also, like exhibit 2, compared to non-designated census tracts, OZs had a higher percentage of tracts classified as stagnant or negative trend (35 percent compared to 31.87 percent). D.C., however, has a higher percentage of OZ designated tracts with a positive gentrification score but are classified as non-gentrifying (38 percent compared to 22.25 percent).

Exhibit 3

D.C. Opportunity Zone Status by Gentrification Category

	Opportunity Zone Status		
Gentrification Measure Category	Eligible, Non-Designated (%)	Designated OZ (%)	Total (%)
Stagnant or Negative Trend	31.87	35.00	32.54
Below-Average Trend	22.25	38.00	25.65
Above-Average Trend	45.88	27.00	41.81
Total	100.00	100.00	100.00

D.C. = District of Columbia. OZ = Opportunity Zone.

Notes: Average is calculated for D.C. Stagnant or Negative Trend refers to those losing college educated population; Below-Average Trend refers to those increasing college educated population at a rate below the D.C. trend; Above-Average Trend refers to those increasing college educated population above the trend such as to be classified as gentrifying.

Source: Authors' calculation from American Community Survey and Internal Revenue Service data

Model Specification

Although exhibits 1–3 show that gentrification itself may have not played a role in OZ designation, the change in neighborhood demographics can affect the pace and types of investments that flow to the census tracts. Two census tracts with the same gentrification rate could have different rates of in-migration of higher income residents and out-migration of lower income

residents. Gentrification usually starts with the in-migration of young college graduates, and the displacement of lower income residents intensifies when higher income college graduates move in. We first attempt to test whether gentrification has differential impacts on vacancy rates in OZ and non-OZ neighborhoods within the CBSAs. We then use D.C. as a case study to analyze the impact of gentrification on migration and predict the impact of business vacancy rate on economic activity in OZ-eligible neighborhoods.

Our primary regression specification is a fixed-effects ordinary least squares model. Equation (2) represents the specification for the 100 most populous CBSAs, and equation (3) represents the specification for D.C.:

$$\Delta Y_i = \beta_0 + \beta_1 \text{ gent} + \mu + \varepsilon \quad (2)$$

$$Z_i = \beta_0 + \beta_1 \text{busvac} + \beta_1 \text{resvac} + \beta X + \gamma + \varepsilon \quad (3)$$

In equation (2) ΔY is our outcome variable representing the rate of change. Depending on the regression, this represents the change in either the residential vacancy rate or the business vacancy rate in census tract *I*; gent is the education-based measure of gentrification as calculated in equation (1).[17] For the regressions on the 100 most populous CBSAs, the change is over the period 2010 to 2016, and CBSA fixed effects are included, denoted by μ. For the regressions on D.C., in equation (3) we employ a panel design, with our dependent variable as the number of permits for the years 2011 through 2015, denoted as Z_i. We include year fixed effects, denoted by γ. In equation (3) busvac and resvac represent business vacancy rate and residential vacancy rate, respectively.

For the D.C. regressions, X represents a vector of socioeconomic factors for which we control. The following section first presents summary statistics and regression results for the 100 most populous CBSAs, followed by summary statistics and regression results for D.C., in which we include more control variables.

Summary Statistics and Results

100 Most Populous CBSAs in the U.S.

Exhibit 4 presents census tract level summary statistics for the 100 most populous CBSAs in the United States. On average, about 10 percent of the census tracts in these CBSAs were granted the OZ designation (exhibit 4). Our gentrification measure shows that, on average, the share of the population over age 25 holding a bachelor's degree or higher in the census tracts within these CBSAs increased approximately 2 percent between 2010 and 2016.

We focus not only on the OZ census tracts, but we include the OZ eligible census tracts because they have been a focal point of the gentrification debate. The regression specification used for the CBSAs is estimated separately on four types of census tracts: 1) designated OZ tracts; 2) non-designated but OZ-eligible tracts; 3) OZ-eligible (all eligible tracts, whether LIC or eligible non-LIC but contiguous tracts); and 4) non-eligible tracts. Results for the four models for which the dependent variable is the change in residential vacancy rate are shown in exhibit 5. Model 1 shows

[17] Calculation of the gentrification measure noted earlier in this article.

the effect of gentrification on the change in residential vacancy rates for OZ census tracts. A one-unit increase in the gentrification measure is associated with a -0.05-unit change in the residential vacancy rate. This result is significant at the 1-percent level. Model 2 shows a significant positive but small effect on residential vacancy rates for non-OZ tracts.

The coefficient of 0.01 is significant at the 1-percent level. Model 3 shows a negative and significant effect on residential vacancy rates for eligible tracts (-0.01), which is significant at the 1-percent level. We also see that the effect is smaller compared to Model 1. That is, gentrification has a larger effect on residential vacancy rates in OZs than eligible census tracts. Model 4 also shows a positive effect (0.02), which is significant at the 0.1-percent level.

Exhibit 4

Summary Statistics of Census Tracts in the 100 Most Populous CBSAs

	N	Mean	St. Dev.	Min	Max
Median Household Income (2010), $	37,615	61,576.94	30,250.42	5,000.00	249,194.00
Median Home Value (2010), $	36,568	287,008.80	191,838.10	11,000.00	1,000,000.00
Median Gross Rent (2010), $	38,067	534.07	469.26	0	8,017
Population below 100% of the Poverty Level (2010), %	37,698	14.09	12.91	0.00	100.00
Median Household Income (2016), $	37,571	65,878.09	33,101.39	3,250.00	249,597.00
Median Home Value (2016), $	36,857	289,710.50	230,363.80	10,200.00	2,000,000.00
Median Gross Rent (2016), $	36,851	1,169.32	467.68	114.00	3,500.00
Population below 100% of the Poverty Level (2016), %	37,717	15.55	13.06	0.00	100.00
Opportunity Zone Rate	35,333	0.10	0.30	0	1
Gentrification Rate	37,938	0.02	0.22	– 1.84	39.90
Residential Vacancy Rate (2010)	28,115	0.04	0.05	0.00	1.00
Business Vacancy Rate (2010)	28,086	0.09	0.08	0.00	0.80
Residential Vacancy Rate (2016)	37,845	0.03	0.05	0.00	1.00
Business Vacancy Rate (2016)	37,829	0.08	0.08	0.00	1.00

CBSAs = core-based statistical areas.

Source: American Community Survey American Community Survey (ACS) 2010 and ACS 2016-5-year average

Exhibit 5

Regression Results for Residential Vacancy Rate

VARIABLES	(1) OZ	(2) Non-OZ	(3) Eligible	(4) Non-Eligible
Gentrification	-0.0480***	0.00617***	-0.0123***	0.0177***
	(0.0153)	(0.00233)	(0.00462)	(0.00212)
Constant	-0.0113	-0.00674***	-0.00565	-0.00836***
	(0.00969)	(0.00214)	(0.00368)	(0.00205)
Observations	2,935	25,127	15,074	12,988
R-squared	0.147	0.082	0.118	0.066
CBSA FE	YES	YES	YES	YES

**p<0.1. **p<0.05. ***p<0.01.*

CBSA = core-based statistical area. FE = fixed effects. OZ = Opportunity Zone.

Note: Standard errors in parentheses.

Source: Authors' calculation from American Community Survey and U.S. Postal Service-U.S. Department of Housing and Urban Development data

These results suggest that increases in the gentrification measure decrease the residential vacancy rate for OZ and eligible census tracts but increase the residential vacancy rate among ineligible tracts. When considering the universe of tracts which are non-OZ (to include both non-eligible tracts, as well as eligible tracts which did not receive the OZ designation), the effect of gentrification was positive and significant as in the case of the non-eligible tracts; however the size of the effect was an order of magnitude smaller.

Considering models for which business vacancy rate is the dependent variable, exhibit 6 shows results for the same group of populations. Like the negative and significant effect of gentrification on the residential vacancy rate for the OZ population, the effect on the business vacancy rate is negative and significant, and in this case, of a larger magnitude than the effect on the residential vacancy rate.

Model 1 shows that a one-unit increase in the gentrification measure is associated with a -0.08 unit change in the business vacancy rate. This result is significant at the 1-percent level. In contrast, the effect of gentrification on the non-OZ population (Model 2) is practically zero (-0.0002). For the eligible population (Model 3), the effect of gentrification on the business vacancy rate is similar in magnitude to the effect on the residential vacancy rate. Model 4, which covers the non-eligible population, is also 0.

Exhibit 6

Regression Results for Business Vacancy Rate

VARIABLES	(1) OZ	(2) Non-OZ	(3) Eligible	(4) Non-Eligible
Gentrification	-0.0772*** (0.0265)	-0.000195 (0.00150)	-0.0140* (0.00790)	5.27e-05 (0.00148)
Constant	0.0522*** (0.0168)	0.00506 (0.00537)	0.0299*** (0.00748)	-0.00975 (0.00691)
Observations	2,932	25,094	15,061	12,965
R-squared	0.095	0.049	0.066	0.047
CBSA FE	YES	YES	YES	YES

**p<0.1. **p<0.05. ***p<0.01.*

CBSA = core-based statistical area. FE = fixed effects. OZ = Opportunity Zone.

Note: Standard errors in parentheses

Source: Authors' calculation from American Community Survey and U.S. Postal Service-U.S. Department of Housing and Urban Development data

Overall, exhibits 5 and 6 suggest a significant correlation between gentrification and attractiveness of OZ-designated census tracts to potential residents and businesses. Federal subsidies toward new investments in OZ tracts are expected to accelerate this process. The economic benefits of the OZ subsidies could be captured by the new affluent residents who could replace the incumbent lower income residents.

Because of the differential impact of gentrification on vacancy rate in OZs, we use D.C. as a case study to further analyze migration and gentrification and to predict how investments from place-based incentives such as OZ can affect economic activity.

D.C. Case Study

Administrative income tax data from the D.C. government allow us to measure gentrification more directly by simultaneously accounting for the in-migration of high-income adults and the out-migration of lower income incumbent residents.

Exhibit 7 presents summary statistics for the census tracts within D.C. In D.C., about 14 percent (25 out of 179) of census tracts have OZ designation. This contrasts with 10 percent of census tracts having OZ designation in the 100 most populous CBSAs. The gentrification rate for D.C. is nevertheless double the rate for the 100 most populous CBSAs (0.04 compared to 0.02). Appendix exhibits A-5 through A-8 show similar summary statistics for census tracts within D.C. for each of the following categories: OZ-eligible, OZ non-eligible, OZ-designated, and OZ-non-designated. OZ-designated tracts and OZ-eligible tracts tend to rank as expected given the eligibility criteria. For example, OZ-designated tracts have the lowest median home value and median rent among the four categories for both 2010 and 2016, followed by OZ-eligible tracts.

Exhibit 7

Summary Statistics of Census Tracts in D.C.

	N	Mean	St. Dev.	Min	Max
Median Household Income (2010), $	175	63,425.41	35,154.07	15,119.00	213,889.00
Median Home Value (2010), $	167	433,329.90	182,856.50	143,400.00	924,000.00
Median Gross Rent (2010), $	178	769.24	515.56	0	3,204
Population below 100% of the Poverty Level (2010), %	176	19.41	13.99	1.30	91.20
Median Household Income (2016), $	175	78,623.75	43,276.66	14,692.00	235,517.00
Median Home Value (2016), $	173	506,302.90	266,187.40	88,600.00	1,498,300.00
Median Gross Rent (2016), $	173	1,402.02	489.09	395.00	2,557.00
Population below 100% of the Poverty Level (2016), %	178	18.88	13.67	0.00	66.30
Opportunity Zone Rate	178	0.14	0.35	0	1
Gentrification Rate	178	0.04	0.09	– 0.06	1.14
Residential Vacancy Rate (2010)	162	0.04	0.03	0.00	0.17
Business Vacancy Rate (2010)	162	0.08	0.06	0.00	0.29
Residential Vacancy Rate (2016)	178	0.03	0.03	0.00	0.11
Business Vacancy Rate (2016)	178	0.06	0.05	0.00	0.24

D.C. = District of Columbia.

Sources: American Community Survey (ACS) 2010; ACS 2016

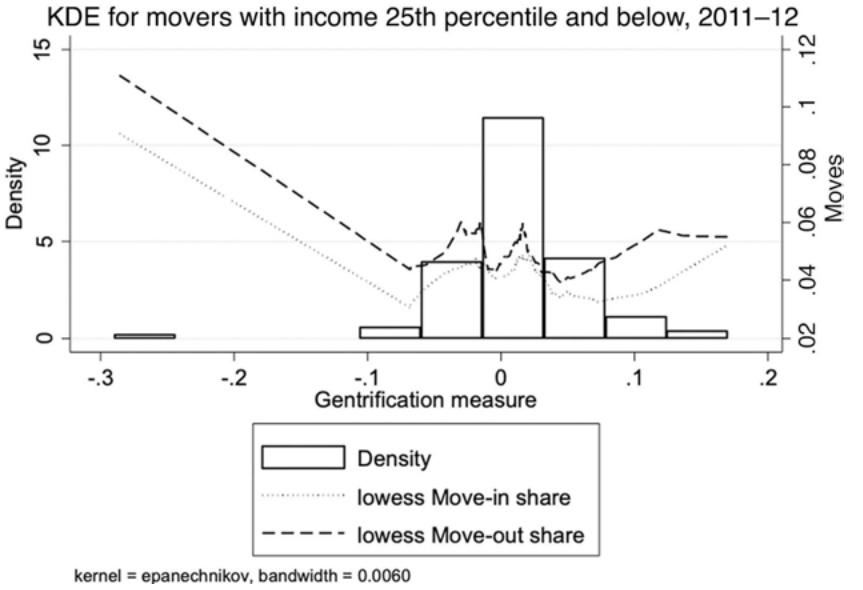
Access to individual income tax and residential property tax data from the D.C. government allows us to provide answers to the displacement effects of gentrification on lower income populations. Due to data limitations, previous studies have relied on limited samples from the U.S. Census Bureau and the IRS. We use kernel density estimates (KDE)[18] to analyze the relationship between migration into and out of OZ-eligible census tracts and gentrification. In the context of possible displacement by the inflow of higher income residents and outflow of lower income residents, we focus on the section of the distribution at or below the 25th percentile of income distribution and at or above the 75th percentile of income distribution. Exhibits 8a–8d and 9a–9d show kernel regression estimates of the relationship between in-migration of higher income groups, out-migration of lower income groups, and our measure of gentrification. They show the year-over-year changes in gentrification and in-and-out migration in D.C. census tracts, for the period 2011 to 2015, for the income group below the 25th percentile and above 75th percentile in OZ-eligible neighborhoods. In the case of those below 25th percentile (exhibits 8a–8d), both the number and the share of census tracts experiencing growth in their college graduate population show an increase between 2011 and 2015, which suggests that gentrification affected more neighborhoods during this period. As shown in the graphs in exhibit 8, the out-migration rate for the lower

[18] Kernel density estimation is a type of nonparametric probability density estimation that fits a model (the relationship between observations of a random variable and their probability density) to the specified distribution (usually with indefinite parameters) of the data. Generally, it is like a histogram in the sense that it allows for an understanding of how a relationship is different at different parts of a distribution. KDE, however, has the advantage of producing a smooth estimate, which is more precise.

income population is consistently above their in-migration rate. In terms of directionality in the relationship between out-migration and gentrification, exhibit 8a shows that, between 2011 and 2012, out-migration for the 25th percentile or lower income group rose with the increase in gentrification. Exhibit 8b shows an almost flat line between 2012 and 2013, followed by decreases in 2013–14 (exhibit 8c) and 2014–15 (exhibit 8d). The difference between the out-migration and the in-migration for the 25th percentile and lower income gets bigger where the gentrification measure is larger than zero. From year to year, as more college graduates moved in, more and more lower income incumbent residents were displaced.

Exhibit 8a

Kernel Density Estimates, 25th Percentile and Below Income Groups in D.C., 2011–12

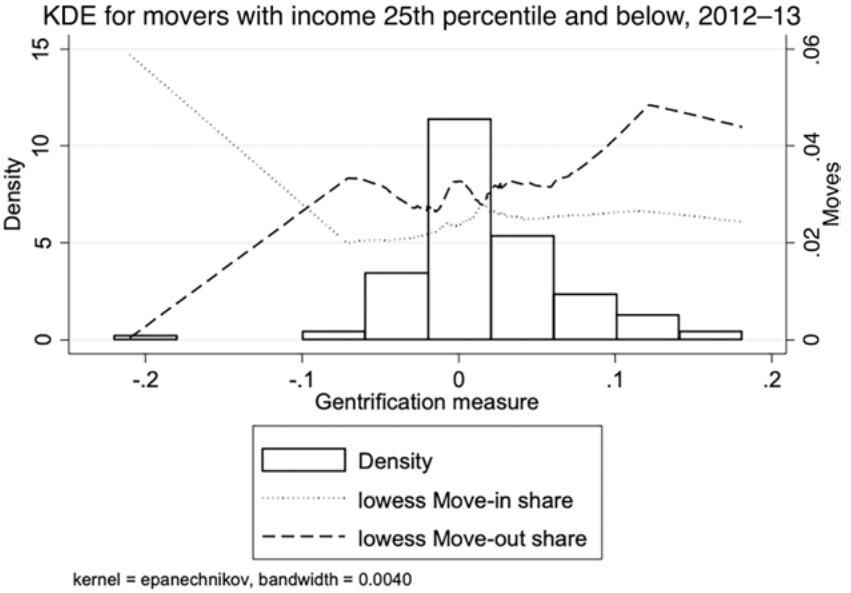


D.C. = District of Columbia. KDE = kernel density estimates.

Sources: D.C. administrative individual income tax data and author's calculation from American Community Survey data

Exhibit 8b

Kernel Density Estimates, 25th Percentile and Below Income Groups in D.C., 2012–13

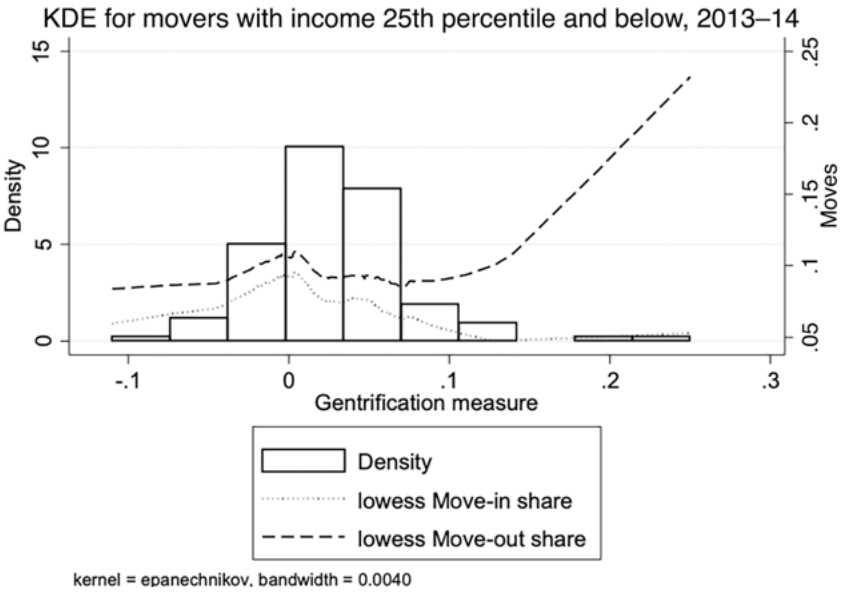


D.C. = District of Columbia. KDE = kernel density estimates.

Sources: D.C. administrative individual income tax data and author's calculation from American Community Survey data

Exhibit 8c

Kernel Density Estimates, 25th Percentile and Below Income Groups in D.C., 2013–14

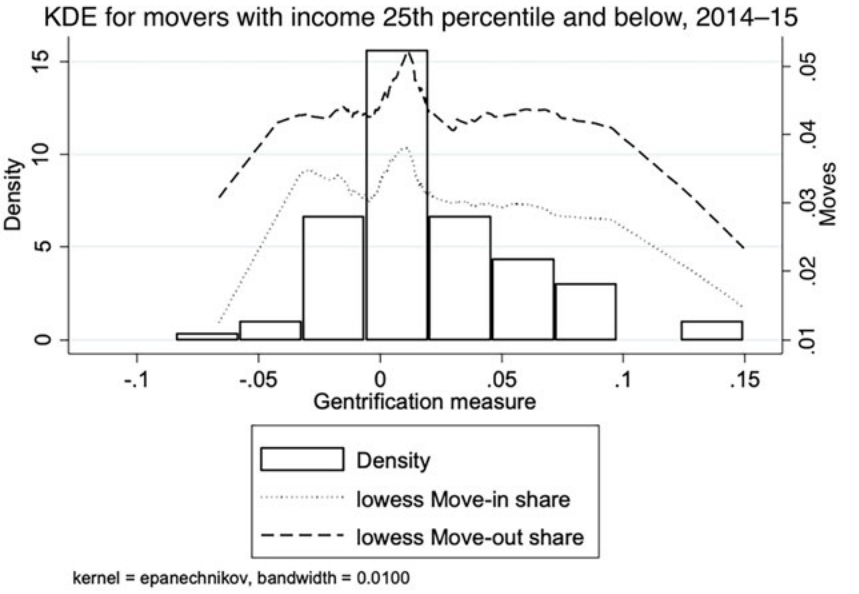


D.C. = District of Columbia. KDE = kernel density estimates.

Sources: D.C. administrative individual income tax data and author's calculation from American Community Survey data

Exhibit 8d

Kernel Density Estimates, 25th Percentile and Below Income Groups in D.C., 2014–15



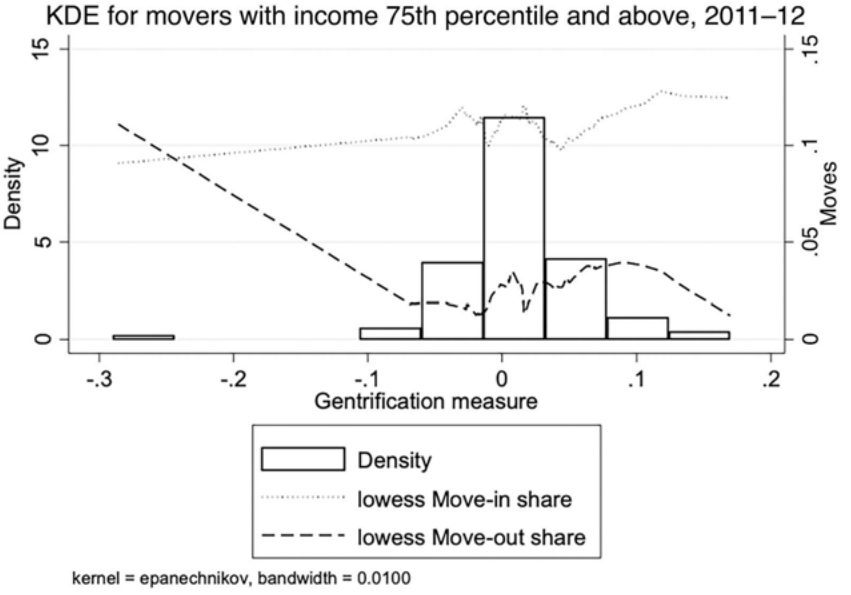
D.C. = District of Columbia. KDE = kernel density estimates.

Sources: D.C. administrative individual income tax data and author's calculation from American Community Survey data

Exhibits 9a–9d display the inflow and outflow of higher income residents to and from the OZ-eligible neighborhoods in D.C. The rate of inflow is about three times larger than the rate of outflow. Exhibits 9a–9d point to two important results. First, in this period, gentrification spread to more lower income neighborhoods in D.C. Second, the rate of the inflow of higher income residents to these neighborhoods was significantly higher than their outflow rate, which suggests that the OZ designation will attract more investments and accelerate the gentrification process.

Exhibit 9a

Kernel Density Estimates, 75th Percentile and Above Income Groups in D.C., 2011–12

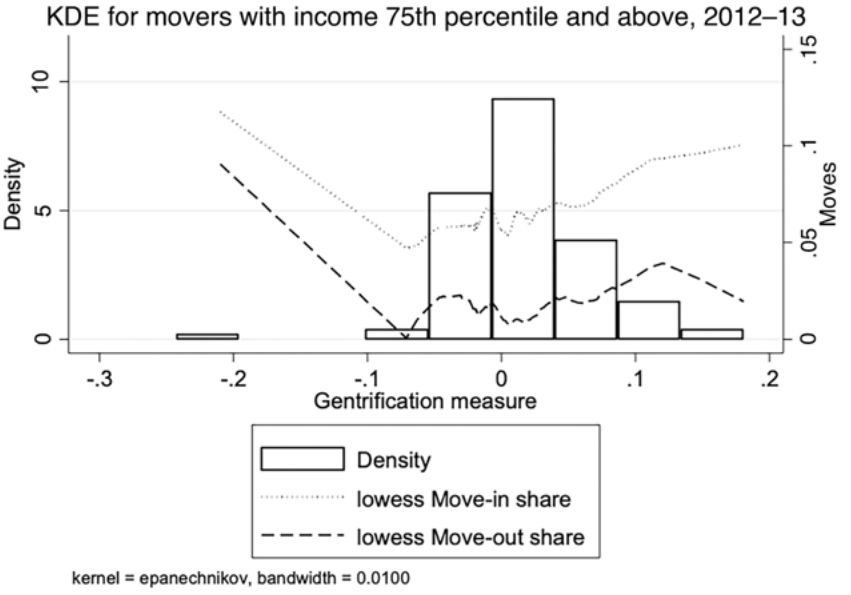


D.C. = District of Columbia. KDE = kernel density estimates.

Sources: D.C. administrative individual income tax data and author's calculation from American Community Survey data

Exhibit 9b

Kernel Density Estimates, 75th Percentile and Above Income Groups in D.C., 2012–13

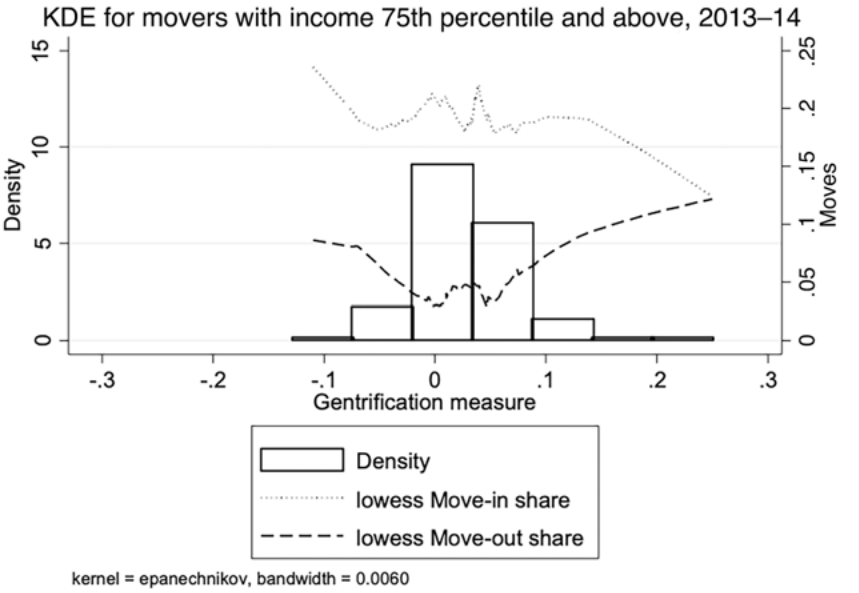


D.C. = District of Columbia. KDE = kernel density estimates.

Sources: D.C. administrative individual income tax data and author's calculation from American Community Survey data

Exhibit 9c

Kernel Density Estimates, 75th Percentile and Above Income Groups in D.C., 2013–14

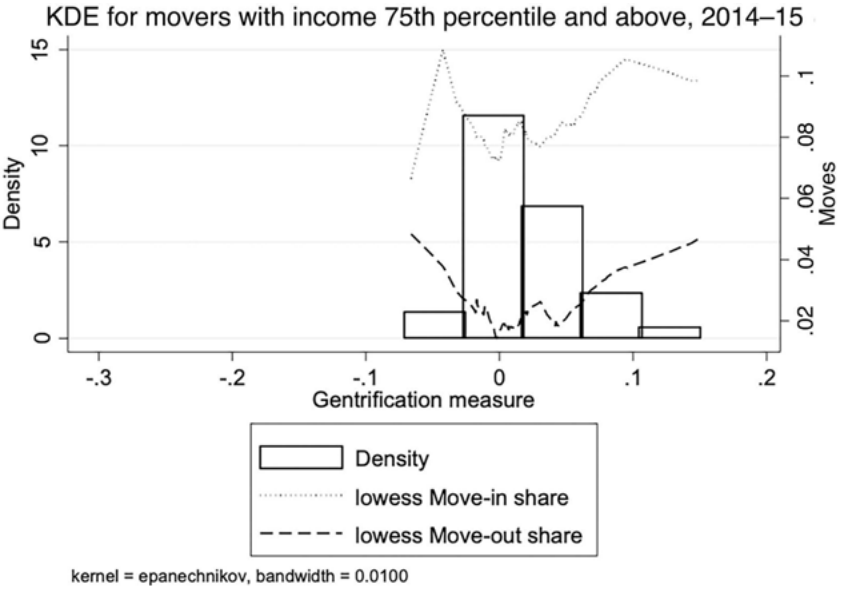


D.C. = District of Columbia. KDE = kernel density estimates.

Sources: D.C. administrative individual income tax data and author's calculation from American Community Survey data

Exhibit 9d

Kernel Density Estimates, 75th Percentile and Above Income Groups in D.C., 2014–15



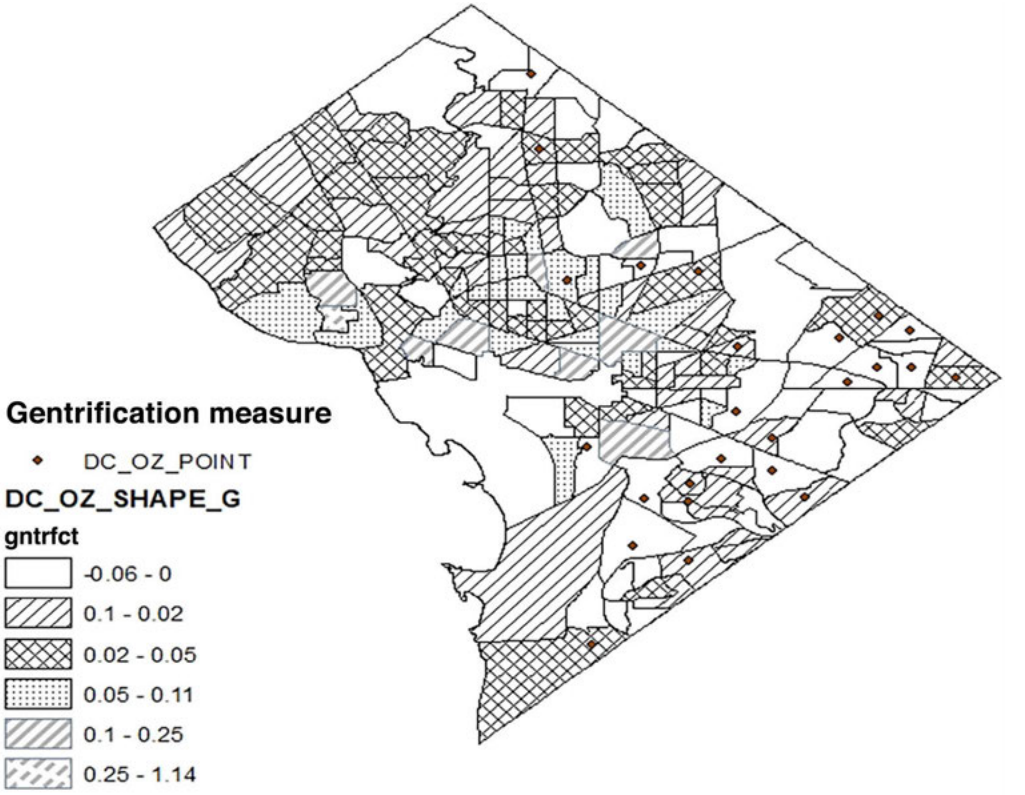
D.C. = District of Columbia. KDE = kernel density estimates.

Sources: D.C. administrative individual income tax data and author's calculation from American Community Survey data

Next, using spatial analysis, we examine the relationship between OZ location decisions and gentrification in D.C. Exhibit 10 shows D.C. census tracts on the gentrification scale, with lack of current gentrification indicated by a lack of pattern, and the various patterns showing different levels on the gentrification over the period studied. The points on the map indicate census tracts designated as OZ. Of the 25 OZ census tracts, 12 have a positive gentrification score, corresponding to 48 percent of OZ census tracts. Only 24 percent, however, or six OZ census tracts, can be classified as gentrifying (that is, with a gentrification score above the city average). Thus, conditional on being an OZ, a census tract is more likely to be non-gentrifying than to be gentrifying. An additional five census tracts are bordering two or more census tracts with a positive gentrification score. Thus, 68 percent of D.C. OZ census tracts have a positive gentrification score or are surrounded by these census tracts. Alternately, Appendix exhibits A-7 through A-10 show the year-to-year gentrification measure changes for the periods 2011–12 (exhibit A-7), 2012–13 (exhibit A-8), 2013–14 (exhibit A-9), and 2014–15 (exhibit A-10). These exhibits indicate which census tracts showed consistent annual increase in the gentrification measure over the entire period, as well as the level of this increase, which tracts had periods of increase and periods without, and which did not experience increase at any time (and may have experienced decrease). The aim of the OZ program is to generate economic activity in distressed areas and areas with difficulty attracting investment. From the literature, we know that gentrifying areas already provide a pull factor in terms of investment dollars, and as such, they do not generally require additional factors to spur economic activity. Whereas we do not have direct evidence on whether gentrification was an explicit factor in the decisionmaking process, we find that there is a positive relationship between gentrification and OZ designation.

Exhibit 10

Gentrification Scale and Designated Opportunity Zones in D.C.



D.C. = District of Columbia. OZ = Opportunity Zone.
Source: Author's calculation from American Community Survey data

After our spatial analysis of OZ location and gentrification, we then try to predict which OZ census tracts will receive higher investments using a fixed-effects ordinary least squares regression focusing on OZ-eligible tracts in our analysis. Exhibit 11 shows our preferred specification. The dependent variable is the number of construction permits, a proxy for new investments, from 2011 to 2015, with residential and business vacancy rates as the main independent variables of interest. We also control for neighborhood and individual characteristics.

The effect of the average business vacancy rate is negative, significant, and relatively stable across models at an approximate value of -0.6. The coefficient on average residential vacancy rate is negative but insignificant. The coefficient on net migration rate per 100 is positive and significant. In predicting which census tracts will be favored in the allocation of OZ investment, however, we expect new investments measured by the number of construction permits to flow to census tracts with lower business vacancy rates and a positive net migration.

Discussion

Our previous analysis of the core-based statistical areas (CBSAs) and D.C. shows that there is a correlation between gentrification and both residential and business vacancy. CBSAs are geographic areas defined in terms of whole counties (or county equivalents) and consists of an urban core of at least 10,000 population and its surrounding socially and economically integrated areas.[19] We also find that the impact of gentrification on economic development, as measured by the vacancy rate is stronger in OZs. Making use of the available administrative D.C. data, we examine the relationship between migration patterns and gentrification. We find that even prior to the designation, displacement of lower income residents was already a feature of these census tracts.

Exhibit 11

Regression Results for Residential Permits

VARIABLES	(1) Permits	(2) Permits	(3) Permits	(4) Permits	(5) Permits	(6) Permits	(7) Permits	(8) Permits	(9) Permits	(10) Permits
Net migration rate per 100 pop										0.310* (0.161)
Assessment									-6.36e-06 (6.88e-06)	-6.42e-06 (6.86e-06)
Income								-0.000278 (0.000277)	-0.000256 (0.000296)	-0.000317 (0.000297)
Unemployment rate							0.205 (0.409)	0.163 (0.411)	0.245 (0.422)	0.262 (0.420)
Poverty rate						0.0943 (0.213)	0.0876 (0.214)	0.0809 (0.214)	0.0956 (0.232)	0.0721 (0.231)
Hispanic population					32.65 (45.81)	30.33 (46.16)	30.06 (46.21)	35.29 (46.50)	23.83 (48.66)	23.36 (48.46)
Non-Hispanic Black					-17.63 (35.28)	-20.19 (35.79)	-22.77 (36.20)	-18.80 (36.42)	-20.06 (39.03)	-18.72 (38.88)
Ave vacancy rate business		-0.665** (0.280)	-0.635** (0.289)	-0.635** (0.289)	-0.656** (0.291)	-0.658** (0.291)	-0.657** (0.292)	-0.666 ** (0.292)	-0.672** (0.298)	-0.649** (0.297)
Ave vacancy rate residential	-0.726 (0.741)		-0.332 (0.758)	-0.332 (0.758)	-0.366 (0.759)	-0.389 (0.762)	-0.395 (0.763)	-0.354 (0.764)	-0.334 (0.820)	-0.289 (0.817)
Constant	59.97*** (4.076)	61.94*** (2.873)	63.36*** (4.337)	63.36*** (4.337)	73.90*** (27.78)	73.57*** (27.82)	73.79*** (27.85)	80.62*** (28.67)	84.46*** (30.56)	86.19*** (30.44)
Observations	464	464	464	464	464	464	464	464	447	447
R-squared	0.125	0.137	0.137	0.137	0.142	0.142	0.143	0.145	0.151	0.160
Number of census tract	116	116	116	116	116	116	116	116	112	112
FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Time Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors in parenthesis

****p<0.01, **p<0.05, *p<0.1*

FE = fixed effects.

Sources: District of Columbia administrative income tax data and U.S. Postal Service-U.S. Department of Housing and Urban Development data

[19] https://www.census.gov/glossary/#term_CoreBasedStatisticalAreasCBSAs

Gentrification is an interesting phenomenon to study in the context of OZ, given that public policy is identified as a causal factor in the recent gentrification literature. Indeed, the investment from public policy can raise expectations regarding neighborhood change, with these expectations spurring a rise in property prices. Whereas early literature found small and often insignificant effects of OZ designation on property prices, the effect in areas which already have some level of expectation of neighborhood improvement (through early signs of gentrification) may react differently to OZ designation compared to other similar census tracts.

To complement the previous migration analysis based on individuals, we turn to loan origination data, which gives an indication of neighborhood dynamics from the property perspective. This data also provide insight into the racial breakdown of loan information. A strand of gentrification literature focuses on this racial component. Appendix exhibits A-1–A-5 show loan originations by dollar amount and number of loans estimated from Home Mortgage Disclosure Act data for four groups of census tracts in D.C., namely OZ-designated, OZ non-designated, OZ-eligible, and OZ non-eligible. Although HMDA loan origination data do not accurately reflect the total number of houses purchased in D.C. in the 2010–19 period, they can be useful in providing a picture of general trends. We also compare the number of loan originations to African-American and non-African-American potential home purchasers shown in appendix exhibits A-3 and A-5. Generally, appendix exhibits A-1 and A-2 show an increase in the loan amount and the number of loans generated to potential homebuyers in OZ-designated and OZ-eligible census tracts between 2010 and 2019 and a decrease in the loan amount and the number of loans in OZ non-designated and OZ non-eligible areas. This shows the potential increase in economic activity and migration to OZ-designated and OZ-eligible areas. We also find a slight increase in the number of loans originated to potential African-American home purchasers in OZ-designated and OZ-eligible census tracts. Additionally, the number of loans originated to potential African-American home purchasers have consistently decreased in OZ non-designated and OZ non-eligible census tracts. If OZ designation increases the rate of gentrification in OZ-designated census tracts, we may observe the displacement of African-American residents from these census tracts after more investments flow into them. The D.C. government tries to spread OZ investments toward the neighborhoods that it designates as policy priorities. It is unclear if the amount of OZ incentives provided by the D.C. government is sufficient to counterbalance the profit opportunities created by gentrification in OZ-designated census tracts.

Conclusion

The Opportunity Zones policy is in its early days, and the long-term effects of the program are yet to be determined. Still, in this article we explore the interaction between Opportunity Zones and gentrification, a process whose effects have been studied for over 50 years.

In the first section of this article, we looked at the interaction between Opportunity Zones and gentrification in CBSAs. We showed that as Opportunity Zones get further into the gentrification process, there is a positive net migration, and evidence of increased economic business activity through the decrease in residential and business vacancy rates. We then used D.C. as a case study, a city known to be experiencing gentrification, to analyze the relationship between

migration and gentrification and to predict the effects of an increase in investment due to policy on economic activity.

The focus of our analysis of migration patterns in D.C. was primarily on two income groups: movers with income below the 25th percentile (low-income movers) and movers with income above the 75th percentile (high-income movers) of the income distribution. We see that the further an Opportunity Zone eligible tract advances into gentrification, the more we observe out-migration among low-income movers. At the same time, we observe increases in in-migration of high-income movers. Furthermore, spatial analysis of gentrification and OZ designation location between 2012 and 2015 showed that D.C. is becoming more gentrified through time. Our analysis also indicates that approximately 68 percent of the OZ-designated census tracts were either gentrifying or adjacent to two or more gentrifying tracts.

In our analysis on D.C., we tried to predict the destination of new investments among OZ eligible census tracts, using construction permits as a proxy for new investments. We found that census tracts with positive net migration and lower business vacancy rates are likely to receive increased permit applications. Thus, based on our previous findings of the stronger negative relationship between gentrification and business vacancy rates in OZ-eligible and OZ-designated census tracts, gentrifying neighborhoods are expected to receive a greater share of new investments as measured by the number of permits. Given recent literature (Hwang and Lin, 2016) on the effect of investment and public policy as a contributor to gentrification, our findings suggests that the selection of gentrifying and gentrification-adjacent census tracts as designated OZs could attract more new financing. Therefore, we expect gentrifying designated OZs to disproportionately benefit from the new investments.

In the future, we expect further research on Opportunity Zones to provide a more precise estimate on the effect of OZ designation on the rate of gentrification once more data become available. Specifically, we expect to see data on actual investment and its effect on designated OZ census tracts. Additionally, it will be interesting to examine the impact of D.C.'s recently passed law[20] regarding receipt of OZ tax benefits at the District level[21] on which projects get funded and the impact on gentrification in D.C.

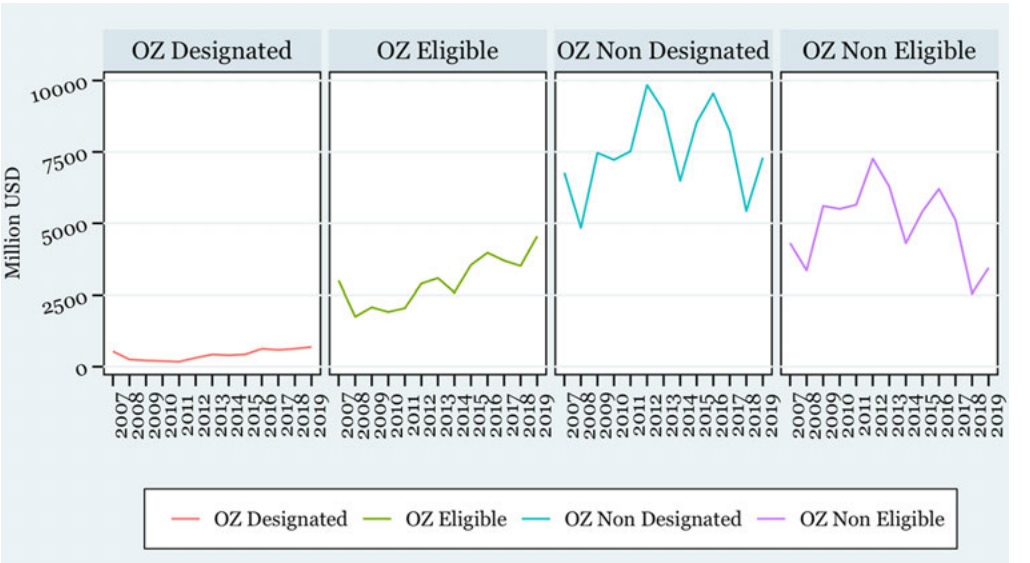
[20] D.C. Act 23-407 Section 2021

[21] D.C. Opportunity Zone Marketplace - District Qualified Opportunity Fund

Appendix

Exhibit A-1

Total Amount of Loans Originated in D.C.

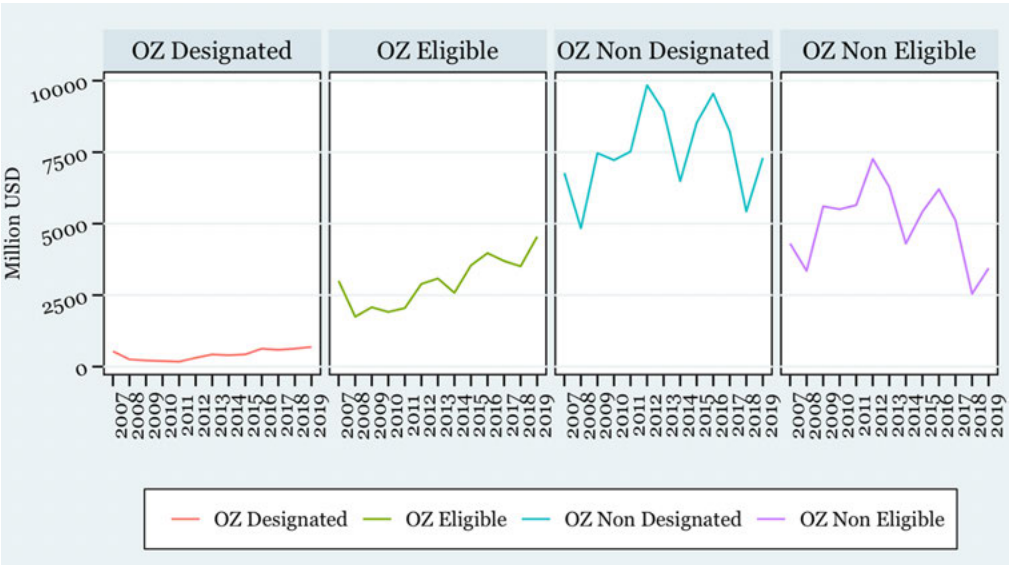


D.C. = District of Columbia. OZ = Opportunity Zone. USD = U.S. dollars.

Sources: Consumer Finance Protection Bureau; Federal Financial Institution Examination Council

Exhibit A-2

Total Number of Loans Originated in D.C.

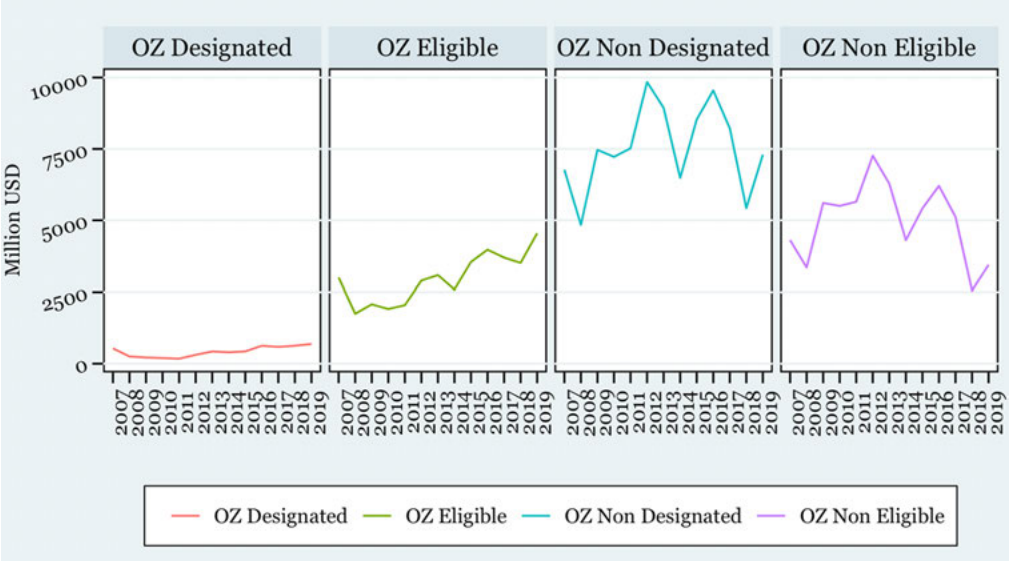


D.C. = District of Columbia. OZ = Opportunity Zone. USD = U.S. dollars.

Sources: Consumer Finance Protection Bureau; Federal Financial Institution Examination Council

Exhibit A-3

Number of Loans Originated to African-American Population in D.C.

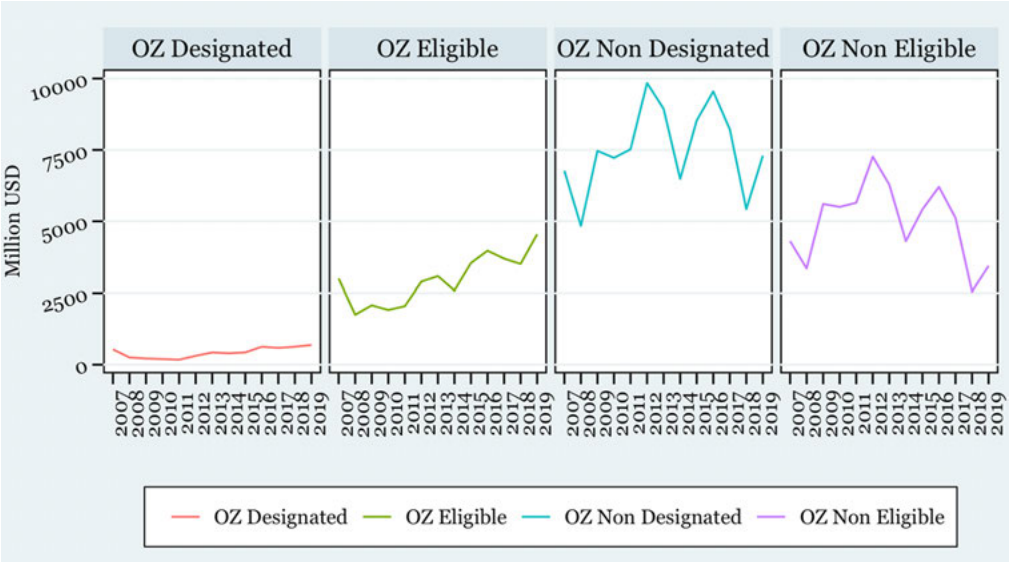


D.C. = District of Columbia. OZ = Opportunity Zone. USD = U.S. dollars.

Sources: Consumer Finance Protection Bureau; Federal Financial Institution Examination Council

Exhibit A-4

Total Amount of Loans Originated to African-American Population in D.C.

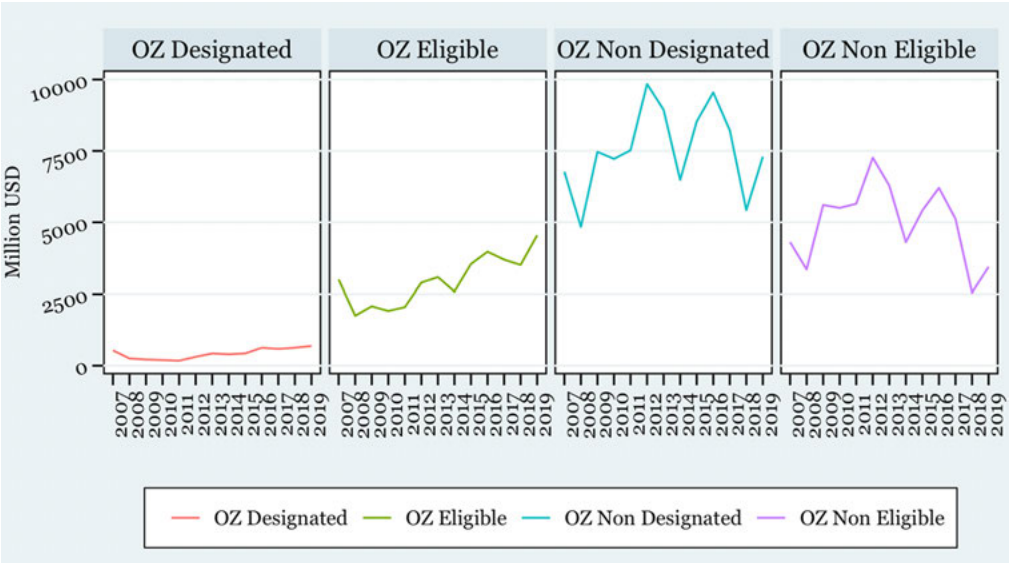


D.C. = District of Columbia. OZ = Opportunity Zone. USD = U.S. dollars.

Sources: Consumer Finance Protection Bureau; Federal Financial Institution Examination Council

Exhibit A-5

Number of Loans Originated to Non-African-American Population in D.C.

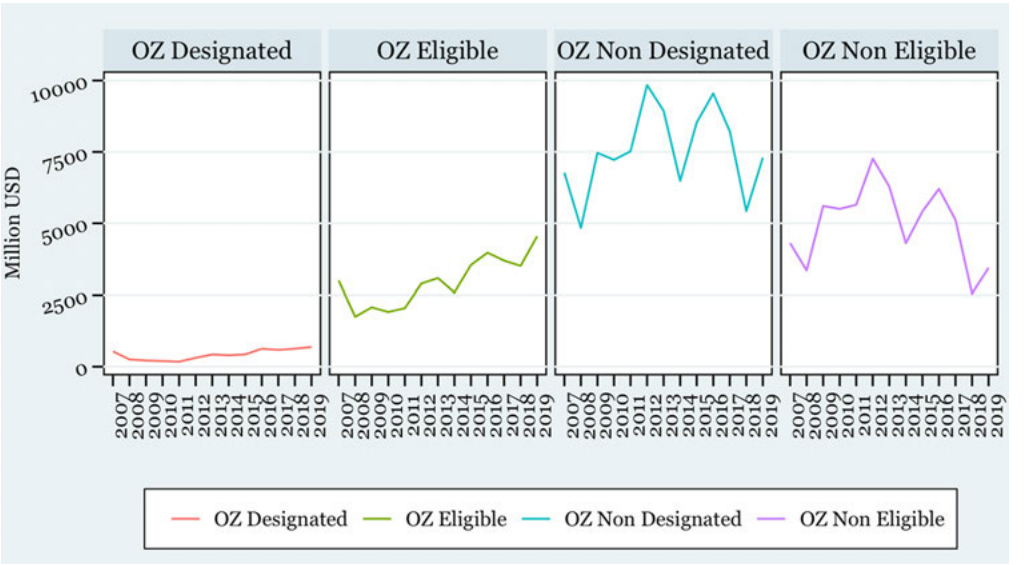


D.C. = District of Columbia. OZ = Opportunity Zone. USD = U.S. dollars.

Sources: Consumer Finance Protection Bureau; Federal Financial Institution Examination Council

Exhibit A-6

Total Amount of Loans Originated to Non-African-American Population in D.C.

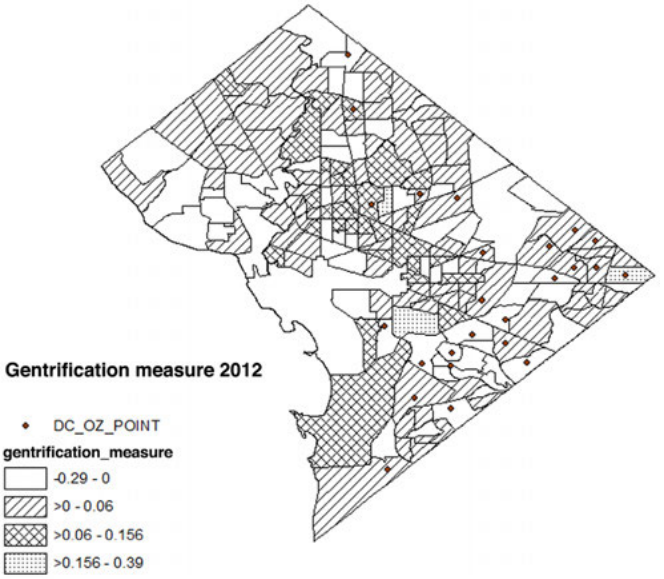


D.C. = District of Columbia. OZ = Opportunity Zone. USD = U.S. dollars.

Sources: Consumer Finance Protection Bureau; Federal Financial Institution Examination Council

Exhibit A-7

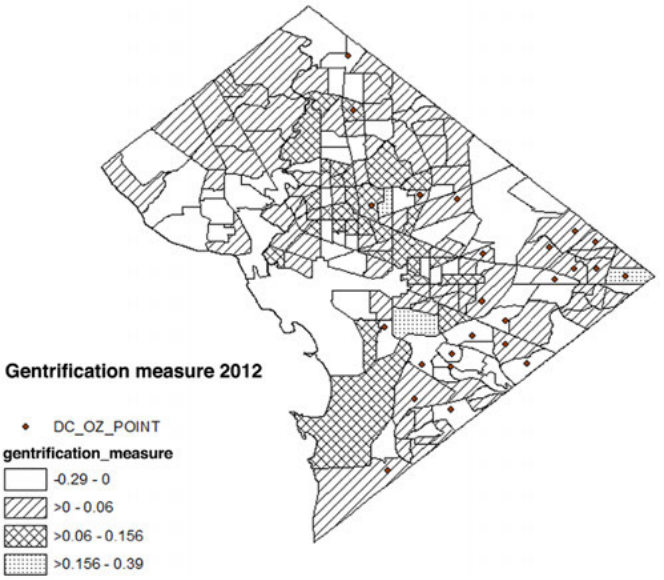
Gentrification Scale and Designated OZ in D.C., 2012



D.C. = District of Columbia. OZ = Opportunity Zone.
Source: Author's calculation from American Community Survey data

Exhibit A-8

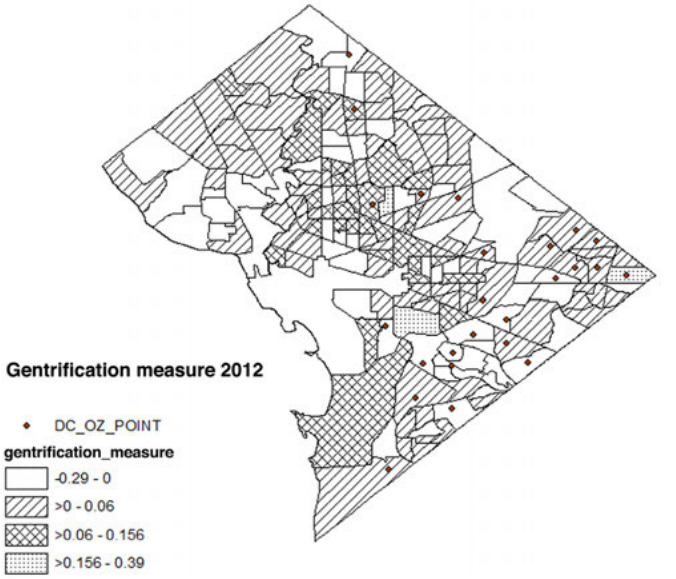
Gentrification Scale and Designated OZ in D.C., 2013



D.C. = District of Columbia. OZ = Opportunity Zone.
Source: Author's calculation from American Community Survey data

Exhibit A-9

Gentrification Scale and Designated OZ in D.C., 2014

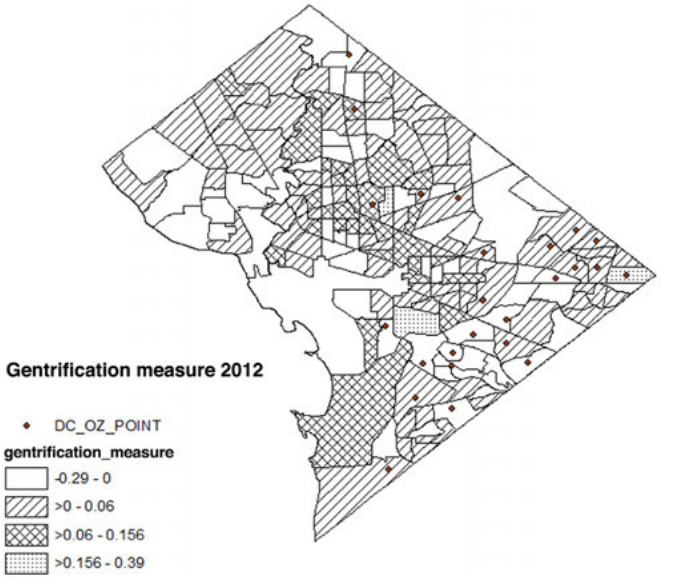


D.C. = District of Columbia. OZ = Opportunity Zone.

Source: Author's calculation from American Community Survey data

Exhibit A-10

Gentrification Scale and Designated OZ in D.C., 2015



D.C. = District of Columbia. OZ = Opportunity Zone.

Source: Author's calculation from American Community Survey data

Exhibit A-11

Summary Statistics of OZ Eligible Census Tracts in 100 Most Populous CBSAs

	N	Mean	St. Dev.	Min	Max
Median Household Income (2010), $	17,996	42,147.09	15,743.46	5,000.00	158,580.00
Median Home Value (2010), $	17,550	229,642.80	162,399.00	11,000.00	988,300.00
Median Gross Rent (2010), $	17,896	880.68	267.55	116.00	2,000.00
Population below 100% of the Poverty Level (2010), %	18,067	3,933.98	1,816.07	0	24,494
Median Household Income (2016), Dollars	17,986	44,062.26	16,654.52	3,250.00	181,406.00
Median Home Value (2016), $	17,403	215,970.70	170,925.30	10,200.00	1,796,900.00
Median Gross Rent (2016), $	17,958	994.06	315.54	114.00	3,391.00
Population below 100% of the Poverty Level (2016), %	18,067	4,113.47	2,027.78	0	33,081
Gentrification Rate	18,018	0.02	0.10	-0.26	6.17
Residential Vacancy Rate (2010)	14,203	0.05	0.06	0.00	0.86
Business Vacancy Rate (2010)	14,196	0.11	0.08	0.00	0.75
Residential Vacancy Rate (2016)	18,050	0.04	0.06	0.00	0.94
Business Vacancy Rate (2016)	18,039	0.10	0.09	0.00	1.00

CBSAs = core-based statistical areas. OZ = Opportunity Zone.

Sources: American Community Survey (ACS) 2010; ACS 2016

Exhibit A-12

Summary Statistics of OZ Non-Eligible Census Tracts in 100 Most Populous CBSAs

	N	Mean	St. Dev.	Min	Max
Median Household Income (2010), $	16,914	82,555.89	28,816.01	6,125.00	249,194.00
Median Home Value (2010), $	16,336	361,463.50	201,537.10	18,600.00	1,000,000.00
Median Gross Rent (2010), $	15,063	1,131.04	358.63	183.00	2,000.00
Population below 100% of the Poverty Level (2010), %	17,266	4,378.36	2,032.43	0	25,000
Median Household Income (2016), $	16,883	89,535.76	30,980.80	11,736.00	249,597.00
Median Home Value (2016), $	16,760	380,066.90	260,333.30	29,400.00	2,000,000.00
Median Gross Rent (2016), $	16,244	1,392.67	519.35	235.00	3,500.00
Population below 100% of the Poverty Level (2016), %	17,266	4,658.01	2,385.83	0	60,942
Gentrification Rate	17,192	0.02	0.32	-1.84	39.90
Residential Vacancy Rate (2010)	12,339	0.02	0.02	0.00	1.00
Business Vacancy Rate (2010)	12,323	0.08	0.07	0.00	0.80
Residential Vacancy Rate (2016)	17,083	0.01	0.02	0.00	1.00
Business Vacancy Rate (2016)	17,086	0.07	0.07	0.00	0.73

CBSAs = core-based statistical areas. OZ = Opportunity Zone.

Sources: American Community Survey (ACS) 2010; ACS 2016

Exhibit A-13

Summary Statistics of OZ Designated Census Tracts in 100 Most Populous CBSAs

	N	Mean	St. Dev.	Min	Max
Median Household Income (2010), $	3,409	33,885.68	13,569.78	6,336.00	117,750.00
Median Home Value (2010), $	3,282	207,244.90	154,177.60	12,600.00	944,400.00
Median Gross Rent (2010), $	3,396	799.39	244.65	116.00	1,981.00
Population below 100% of the Poverty Level (2010), %	3,422	3,692.83	1,864.64	0	24,494
Median Household Income (2016), Dollars	3,408	35,036.56	14,052.84	4,621.00	130,592.00
Median Home Value (2016), $	3,216	191,499.80	160,449.80	10,400.00	1,321,400.00
Median Gross Rent (2016), $	3,406	901.51	292.08	203.00	2,983.00
Population below 100% of the Poverty Level (2016), %	3,422	3,866.72	2,055.80	0	28,186
Gentrification Rate	3,406	0.02	0.04	-0.12	1.01
Residential Vacancy Rate (2010)	2,746	0.07	0.07	0.00	0.57
Business Vacancy Rate (2010)	2,746	0.12	0.08	0.00	0.62
Residential Vacancy Rate (2016)	3,417	0.05	0.07	0.00	0.69
Business Vacancy Rate (2016)	3,419	0.11	0.09	0.00	0.86

CBSAs = core-based statistical areas. OZ = Opportunity Zone.

Sources: American Community Survey (ACS) 2010; ACS 2016

Exhibit A-14

Summary Statistics of OZ Non-Designated Census Tracts in 100 Most Populous CBSAs

	N	Mean	St. Dev.	Min	Max
Median Household Income (2010), $	31,501	64,738.04	30,438.96	5,000.00	249,194.00
Median Home Value (2010), $	30,604	302,408.80	195,402.80	11,000.00	1,000,000.00
Median Gross Rent (2010), $	29,563	1,017.58	338.26	159.00	2,000.00
Population below 100% of the Poverty Level (2010), %	31,911	4,200.28	1,938.86	0	25,000
Median Household Income (2016), $	31,461	69,442.53	33,300.67	3,250.00	249,597.00
Median Home Value (2016), $	30,947	307,383.50	237,954.30	10,200.00	2,000,000.00
Median Gross Rent (2016), $	30,796	1,214.55	474.49	114.00	3,500.00
Population below 100% of the Poverty Level (2016), %	31,911	4,434.56	2,237.29	0	60,942
Gentrification Rate	31,804	0.02	0.24	-1.84	39.90
Residential Vacancy Rate (2010)	23,796	0.03	0.04	0.00	1.00
Business Vacancy Rate (2010)	23,773	0.09	0.08	0.00	0.80
Residential Vacancy Rate (2016)	31,716	0.02	0.04	0.00	1.00
Business Vacancy Rate (2016)	31,706	0.08	0.08	0.00	1.00

CBSAs = core-based statistical areas. OZ = Opportunity Zone.

Sources: American Community Survey (ACS) 2010; ACS 2016

Exhibit A-15

Summary Statistics of OZ Eligible Census Tracts in D.C.

	N	Mean	St. Dev.	Min	Max
Median Household Income (2010), $	113	47,323.70	24,561.66	15,119.00	158,580.00
Median Home Value (2010), $	109	358,219.30	143,959.40	143,400.00	836,900.00
Median Gross Rent (2010), $	115	731.28	417.54	0	2,294
Population below 100% of the Poverty Level (2010), %	115	3,029.12	1,178.53	0	7,089
Median Household Income (2016), $	113	57,897.67	32,103.94	14,692.00	181,406.00
Median Home Value (2016), $	111	406,646.00	222,695.60	88,600.00	1,425,000.00
Median Gross Rent (2016), $	112	1,185.38	418.92	395.00	2,557.00
Population below 100% of the Poverty Level (2016), %	115	3,463.57	1,309.43	83	7,665
Gentrification Rate	115	0.04	0.11	-0.06	1.14
Residential Vacancy Rate (2010)	107	0.05	0.04	0.003	0.17
Business Vacancy Rate (2010)	107	0.08	0.06	0.00	0.29
Residential Vacancy Rate (2016)	115	0.03	0.03	0.00	0.11
Business Vacancy Rate (2016)	115	0.06	0.06	0.00	0.24

CBSAs = core-based statistical areas. OZ = Opportunity Zone.

Sources: American Community Survey (ACS) 2010; ACS 2016

Exhibit A-16

Summary Statistics of OZ Non-Eligible Census Tracts in D.C.

	N	Mean	St. Dev.	Min	Max
Median Household Income (2010), $	62	92,772.08	32,585.55	43,476.00	213,889.00
Median Home Value (2010), $	58	574,486.20	164,457.90	273,400.00	924,000.00
Median Gross Rent (2010), $	63	838.52	656.30	0	3,204
Population below 100% of the Poverty Level (2010), %	63	3,197.14	1,334.68	0	7,012
Median Household Income (2016), $	62	116,398.70	34,696.05	54,780.00	235,517.00
Median Home Value (2016), $	62	684,721.00	244,810.80	297,400.00	1,498,300.00
Median Gross Rent (2016), $	61	1,799.77	335.59	1,055.00	2,494.00
Population below 100% of the Poverty Level (2016), %	63	3,574.83	1,428.16	65	7,366
Gentrification Rate	63	0.04	0.04	-0.05	0.20
Residential Vacancy Rate (2010)	55	0.02	0.02	0.00	0.07
Business Vacancy Rate (2010)	55	0.08	0.06	0.00	0.25
Residential Vacancy Rate (2016)	63	0.01	0.01	0.00	0.04
Business Vacancy Rate (2016)	63	0.05	0.05	0.00	0.22

CBSAs = core-based statistical areas. OZ = Opportunity Zone.

Sources: American Community Survey (ACS) 2010; ACS 2016

Exhibit A-17

Summary Statistics of OZ Designated Census Tracts in D.C.

	N	Mean	St. Dev.	Min	Max
Median Household Income (2010), $	24	33,305.71	9,271.65	19,238.00	56,736.00
Median Home Value (2010), $	24	276,358.30	63,105.25	143,400.00	408,400.00
Median Gross Rent (2010), $	25	765.60	296.62	0	1,422
Population below 100% of the Poverty Level (2010), %	25	2,966.44	1,031.27	34	4,771
Median Household Income (2016), $	24	38,291.38	15,074.93	14,692.00	87,535.00
Median Home Value (2016), $	23	301,269.60	98,106.65	220,500.00	590,100.00
Median Gross Rent (2016), $	24	918.29	200.64	440.00	1,317.00
Population below 100% of the Poverty Level (2016), %	25	3,302.04	1,139.88	211	5,660
Gentrification Rate	25	0.01	0.02	-0.01	0.07
Residential Vacancy Rate (2010)	22	0.06	0.03	0.005	0.12
Business Vacancy Rate (2010)	22	0.11	0.06	0.02	0.29
Residential Vacancy Rate (2016)	25	0.05	0.03	0.00	0.11
Business Vacancy Rate (2016)	25	0.09	0.05	0.00	0.17

CBSAs = core-based statistical areas. OZ = Opportunity Zone.
Sources: American Community Survey (ACS) 2010; ACS 2016

Exhibit A-18

Summary Statistics of OZ Non-Designated Census Tracts in D.C.

	N	Mean	St. Dev.	Min	Max
Median Household Income (2010), $	151	68,212.65	35,385.53	15,119.00	213,889.00
Median Home Value (2010), $	143	459,674.80	183,246.50	173,700.00	924,000.00
Median Gross Rent (2010), $	153	769.83	543.72	0	3,204
Population below 100% of the Poverty Level (2010), %	153	3,108.55	1,266.92	0	7,089
Median Household Income (2016), $	151	85,034.20	42,849.07	17,303.00	235,517.00
Median Home Value (2016), $	150	537,741.30	269,977.50	88,600.00	1,498,300.00
Median Gross Rent (2016), $	149	1,479.93	477.17	395.00	2,557.00
Population below 100% of the Poverty Level (2016), %	153	3,535.78	1,381.43	65	7,665
Gentrification Rate	153	0.04	0.10	-0.06	1.14
Residential Vacancy Rate (2010)	140	0.04	0.03	0.00	0.17
Business Vacancy Rate (2010)	140	0.08	0.06	0.00	0.26
Residential Vacancy Rate (2016)	153	0.02	0.02	0.00	0.11
Business Vacancy Rate (2016)	153	0.06	0.05	0.00	0.24

CBSAs = core-based statistical areas. OZ = Opportunity Zone.
Sources: American Community Survey (ACS) 2010; ACS 2016

Acknowledgments

The authors wish to thank the Washington, D.C., Office of the Chief Financial Officer for data access. Support for this research was provided in part by the Robert Wood Johnson Foundation's Policies for Action program. The views expressed here do not necessarily reflect the views of the Foundation.

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Collaboration to Support Further Redevelopment and Revitalization in Communities with Opportunity Zones

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Abstract

Opportunity Zones (OZs) were created to drive economic development and job creation in low-income, disinvested neighborhoods that need private investment to support new and improved spaces, services, and economic opportunities for their residents. Part of the U.S. Environmental Protection Agency's (EPA's) Office of Policy, the Office of Community Revitalization (OCR) supports community-driven efforts to improve economic, environmental, community, and human health outcomes by convening community, local, state, federal, and private-sector actors that can help communities strategically plan for the use of public and private capital and implement their plans for economic growth and environmental protection. To support the more than 34.8 million people living in communities with Qualified Opportunity Zones (QOZs), OCR piloted an enhanced, focused technical assistance offering, strengthened interagency collaboration, and expanded geospatial planning and analysis capabilities to support economically distressed communities in their revitalization efforts. OCR also played a role in facilitating internal coordination across EPA and developed a community of practice with community development, sustainability, and brownfield revitalization staff in EPA's 10 regions. The premise of this initiative was that without meaningful community engagement, traditional investment could result in unintended adverse consequences, such as displacement of people, businesses, and cultures. Equitable investment engages the community to define project benefits and seeks to create thriving, sustainable neighborhoods of opportunity for all.[1]

[1] There are two sources of data used for this article. One is American Community Survey 2015-2018, Table B03002 and the other is our EPA-Enhanced Qualified Opportunity Zones Feature Layer and Map Service, which provide data summarized or in some cases aggregated to be displayed at the census tract level. The full metadata for this Layer is provided at this link: https://epa.maps.arcgis.com/home/item.html?id=01e8be27c317405fb7cdb17e4857b707

Building EPA's Approach to Engaging on Qualified Opportunity Zones

As the QOZ designation process and guidance on the tax incentive came together, EPA developed an approach that built on emerging best practices, programs, and partnership models for supporting community development. The Office of Brownfields and Land Revitalization conducted early work to clarify the rules for brownfield sites, and the Superfund program developed tailored information about applicability with Superfund sites. EPA assigned "Regional OZ Leads" in each of the 10 EPA regional offices, and OCR convened this network with partners from program offices monthly.

In close collaboration with EPA regions and program offices, OCR led the development of an internal geospatial database and mapping application known as the OZ Mapper that pulls together public data from the United States Department of Agriculture (USDA), Centers for Disease Control and Prevention (CDC), the U.S. Census Bureau, the U.S. Department of Health & Human Services (HHS), and others to complement EPA-generated data and provide a comprehensive snapshot of key environmental, health, and economic factors for each QOZ in the country. This tool allows users to look up any QOZ tract and view additional data points, such as the number of EPA-designated Brownfields, Superfund sites, or Toxic Release facilities in the tract; whether food access is limited; and whether the area is considered medically underserved, among other indicators. In addition to reviewing selected OZ tracts, this tool can be used to identify trends across QOZs, offering users insights such as the finding that more than 65 percent of OZ tracts overlap with floodplains (as estimated by the EPA's EnviroAtlas project; EPA, 2018) or that 47 percent of QOZs have impaired waters running through them. Given their environmental and health impacts and the potential for redevelopment, the number of brownfields in EPA's Assessment, Cleanup, and Redevelopment Exchange System (ACRES) database included for each QOZ is another relevant data point; however, it includes only those brownfields that have been included as part of EPA's Brownfields Program (EPA, n.d.a). For the complete list of the 40 data layers included in the OZ Mapper, see exhibit 11 at the end of this article. The beta version of the OZ Mapper was released in January 2021 and is available online.[2]

Reaching Communities with Qualified Opportunity Zones

In response to requests from communities for information on how to understand their QOZ designations and associated opportunities, OCR developed a pilot technical assistance program to support communities with QOZs and increase their capacity to leverage private-sector capital and other development finance tools.

OCR and Regional Opportunity Zone Leads identified several communities with which to partner, including rural communities, mid-sized cities, and specific neighborhoods and large sites in major urban areas. Exhibit 1 lists the communities, context, and geographic scale and describes the goals of the technical assistance. EPA invited federal partners to participate and share resources related to economic development, development and revitalization, and small business support. Those partners included the Economic Development Administration, U.S. Department of Housing and

[2] The OZ map can be found by searching "Opportunity Zones—ArcGIS."

Urban Development (HUD), Small Business Administration (SBA), USDA Rural Development, and Federal Highway Administration (FHWA). Many state agencies—typically the commerce, environmental, and transportation agencies—joined as well.

In each community, key community and local government actors created or strengthened relationships with cross-sector partners. Examples of initial outcomes include the following:

- Updating and strengthening community plans.
- Submitting grant applications.
- Incorporating a new 501(c)3 nonprofit.
- Preparing sites.
- (In one case) Developing a strategy for setting up a community-driven Qualified Opportunity Fund and a Real Estate Investment Fund.

To date, the community stakeholders have not facilitated or developed deals with OZ capital. Although the subject of Opportunity Zones brought stakeholders together, the result could be equitable development or revitalization projects that do not necessarily use OZ capital but access other financial resources in new ways.

The pilot assistance was designed to help communities with plan implementation, including overcoming project financing barriers to attract private capital. It became clear that public-sector resources are a key to demonstrating commitment, minimizing risk from projects by addressing predevelopment needs (site cleanup, for example), and making the community more attractive to private-sector investors. The technical assistance helped communities tailor strategies focused on local priorities to encourage development that fits their community vision. It also helped create local guidelines that protect and preserve treasured assets of each community.

Exhibit 1

Six Communities Included in EPA's Opportunity Zone Pilot Technical Assistance

Community	Context	Geographic Scale	Description
Wenatchee, WA	Rural	Regional (four counties and the Colville tribes)	Regional strategy among communities and tribes to support investments in small business, affordable housing, broadband, regional food system, and public health
St. Louis, MO	Urban	Neighborhood, Corridor	Strategy to address site prep and cleanup barriers and barriers to access OZ, public funds, and incentives for MLK corridor/Northside neighborhood
Lorain, OH	Small city	City	Strategy to attract OZ funds and investment to advance community priorities and Lorain Areawide Brownfield Plan
Phoenix, AZ	Urban	Major site	Revitalization of landfill and sand and gravel mining sites in portion of the Rio Reimagined Project area (Urban Waters Partnership location)
Huntington, WV	Small city	Major site	Strategic plan to support OZ investment in American Car & Foundry site, subject of Brownfields Area-Wide Plan
Belfast, ME	Town	Cluster of sites	Community prospectus to support the redevelopment of catalytic brownfield sites

EPA = Environmental Protection Agency. MLK = Martin Luther King Jr. Drive. OZ = Opportunity Zone.

Source: EPA Office of Community Revitalization, 2021.

Using OZ Mapper Data to Build Pilot Community Profiles

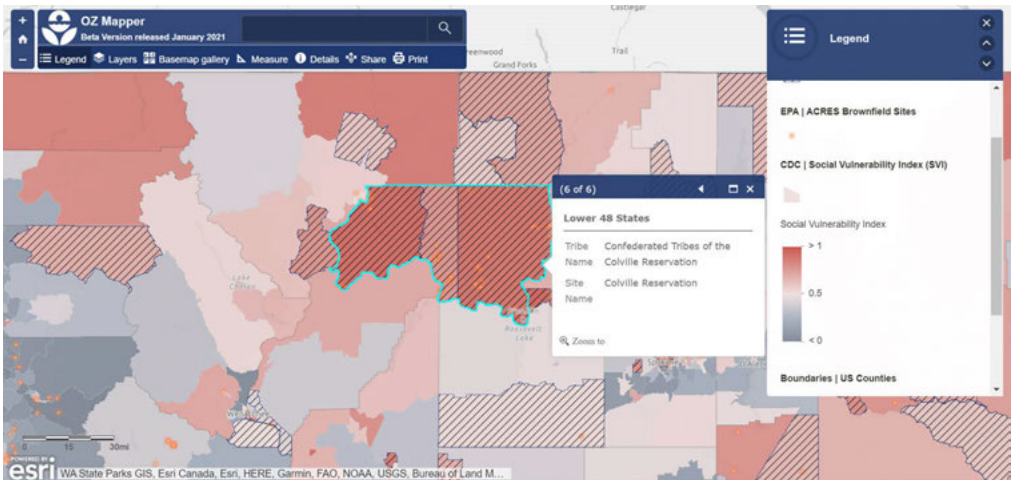
The Opportunity Zone (OZ) Mapper is a flexible resource with many datasets. The following examples demonstrate how users can prioritize indicators and measures that are most relevant to the needs and goals of a community. With a mix of environmental, health, and social data layers, users can explore the information and pick salient indicators to visually tell the story of an opportunity for multibenefit investment in a particular community. Accordingly, the indicators vary for each example described from the pilot OZ technical assistance (exhibit 1). Each of the four examples represents different community sizes, geographic scope, and goals, so they are not presented for comparison but rather show how the OZ Mapper can support building unique community profiles.

North Star Region, Washington

In Washington State, four counties and one tribe contain a total of 11 large QOZs that collaborate on community development. Their Opportunity Zone strategy was focused regionally on the North Central Washington Economic Development District (NCWEDD). Through work with EPA, the city of Wenatchee, Washington, and the NCWEDD partners wanted to learn more about how their QOZs could benefit their healthcare, broadband, equity, social cohesion, and walkability goals. The OZ Mapper snapshot (exhibit 2) shows the diversity of places in the region and how partners might explore and use data such as these to develop targeted, place-based revitalization strategies. As indicated in exhibit 3, nearly all these tracts are designated as medically underserved, so public health and health care became a common sector to initiate regional, shared projects.

Exhibit 2

Visualization of NCWEDD Opportunity Zones: CDC Social Vulnerability Index and Brownfields



ACRES = Assessment, Cleanup, and Redevelopment Exchange System. CDC = Centers for Disease Control and Prevention. EPA = Environmental Protection Agency. NCWEDD = North Central Washington Economic Development District. OZ = Opportunity Zone.

Source: EPA-Enhanced Qualified Opportunity Zones. ArcGIS Feature Layer by U.S. Environmental Protection Agency. https://epa.maps.arcgis.com/home/item.html?id=01e8be27c317405fb7cdb17e4857b707

Exhibit 3

EPA's Opportunity Zone Data on the 11 QOZs in Washington's Opportunity Zones NCWEDD Region

QOZ Number	County	# of Brownfields	Walkability Index Score (max = 20)	Impaired Waters Present?	Is it a Tribal Area?	Social Vulnerability Index Score (max = 1)	Is it a Food Desert?	Is it Rural?	2018 Population	% of Households with Broadband access?	Does it Overlap with Floodplain	Is it Medically Underserved?
53007961200	Chelan	0	6.7	Y	N	0.6	N	N	4,366	73.8	N	Y
53007961000	Chelan	2	16.6	N	N	0.9	N	N	6,847	70.7	N	N
53007961100	Chelan	0	12.8	N	N	0.9	Y	N	10,118	81.6	N	Y
53017950300	Douglas	1	4.0	Y	N	0.7	Y	N	6,917	81.2	Y	Y
53019940000	Ferry	14	6.3	Y	Y	0.8	Y	Y	1,545	53.7	N	Y
53019970100	Ferry	0	4.0	Y	N	0.8	Y	Y	2,998	67.2	Y	Y
53019970200	Ferry	1	5.2	Y	Y	0.7	N	Y	3,033	65.5	Y	Y
53047970800	Okanogan	0	6.2	Y	Y	0.9	Y	Y	5,406	65.6	N	Y
53047970400	Okanogan	0	4.7	N	N	0.8	N	Y	3,651	73.4	N	Y
53047940100	Okanogan	18	5.7	Y	Y	0.9	N	Y	2,782	67.4	Y	Y
53047940200	Okanogan	10	5.2	Y	Y	0.9	N	Y	2,883	66.6	N	Y

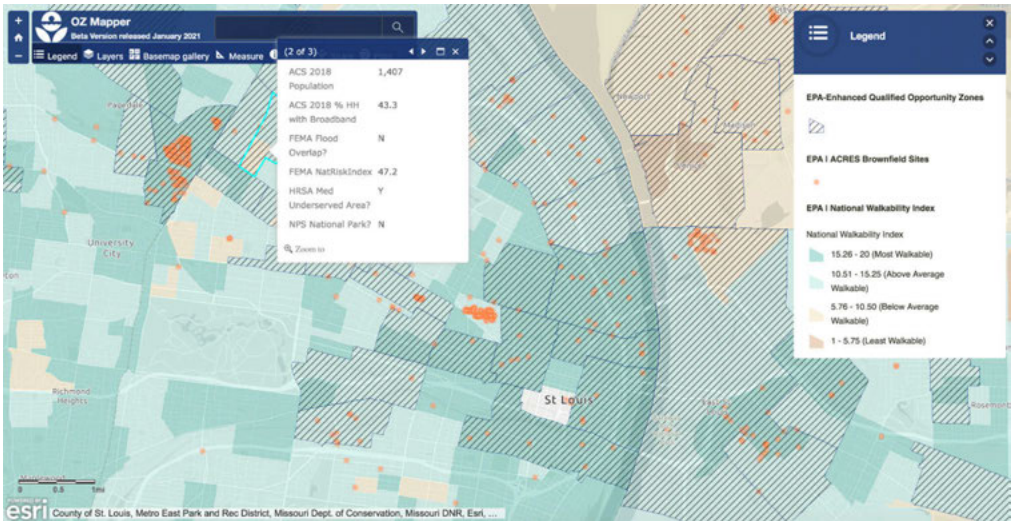
EPA = Environmental Protection Agency. NCWEDD = North Central Washington Economic Development District. QOZ = Qualified Opportunity Zone.
Source: EPA-Enhanced Qualified Opportunity Zones. ArcGIS Feature Layer by U.S. Environmental Protection Agency.
https://epa.maps.arcgis.com/home/item.html?id=01e8be27c317405fb7cdb17e4857b707

St. Louis, Missouri

In St. Louis, the Chief Opportunity Zones Officer and North Star Community Partners, a coalition of community development corporations, wanted to leverage QOZs to revitalize the Martin Luther King, Jr. (MLK) Drive corridor. This underinvested area includes predominantly African-American residents. The community partners have decades of experience working in the MLK Drive corridor neighborhoods and pointed to opportunities for redevelopment, including on Brownfield sites. The OZ Mapper data profile provides one way of accounting for Brownfields sites using the ACRES database. It confirms that the demographic makeup of the corridor is almost the highest percentage minority and low-income in the country (using the Environmental Justice Screening and Mapping Tool [EJSCREEN] Demographic Index). In addition, these tracts have more USDA-designated food deserts than the rest of the city, presenting opportunities to encourage development that provides essential amenities, such as grocery stores.

Exhibit 4

Visualization of QOZs and Relative Walkability Along St. Louis's MLK Drive Corridor



ACRES = Assessment, Cleanup, and Redevelopment Exchange System. ACS = American Community Survey. EPA = Environmental Protection Agency. FEMA = Federal Emergency Management Agency. HRSA = Health Resources & Services Administration. MLK = Martin Luther King Jr. NPS = National Park Service. OZ = Opportunity Zone. QOZs = Qualified Opportunity Zones.

Source: EPA-Enhanced Qualified Opportunity Zones. ArcGIS Feature Layer by U.S. Environmental Protection Agency.
https://epa.maps.arcgis.com/home/item.html?id=01e8be27c317405fb7cdb17e4857b707

Exhibit 5

EPA's Opportunity Zone Data on Tracts in the North Side of St. Louis

Opportunity Zone Data	Project Area: MLK Drive Corridor	Broader Area: St. Louis, MO
Total Number of Brownfields	15	228
Median EJSCREEN Demographic Index	96.26	91.90
Percent Tracts that are Food Deserts	16.67	7.69
Total Population	9,009	78,343

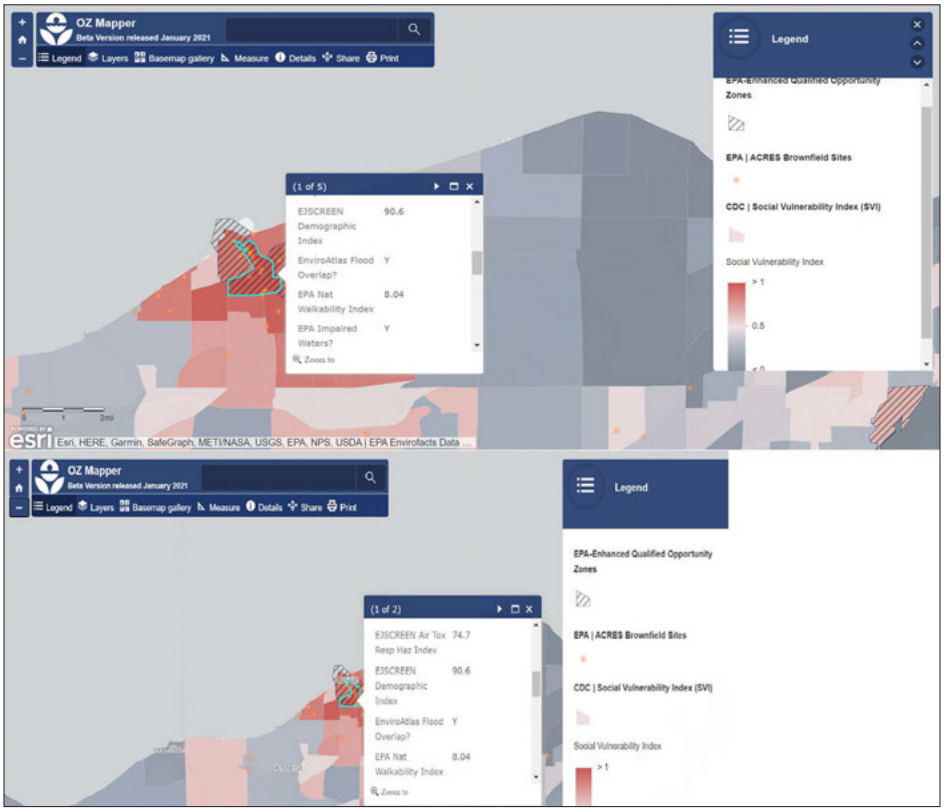
EJSCREEN = Environmental Justice Screening and Mapping Tool. EPA = Environmental Protection Agency. MLK = Martin Luther King Jr.
Source: EPA-Enhanced Qualified Opportunity Zones. ArcGIS Feature Layer by U.S. Environmental Protection Agency.
https://epa.maps.arcgis.com/home/item.html?id=01e8be27c317405fb7cdb17e4857b707

Lorain, Ohio

In Lorain, the Lorain Port and Finance Authority (an economic development organization) and city and county governments aimed to strategically align their jurisdictional resources to support investment in the community's QOZs. The community completed a Brownfields Areawide Plan in 2018, and four key Brownfield sites are in the QOZs. The Black River runs through Lorain into Lake Erie, placing the community in EPA's Great Lakes Areas of Concern. The health of the river and lake is tied to the health of the community, and the OZ Mapper data profile (exhibits 6 and 7) highlight the interconnection of environmental, social, and economic indicators in Lorain and the corresponding benefits of taking a holistic approach to economic development.

Exhibit 6

Visualization of QOZs in Lorain, with Impaired Waters, Flood Risks, and Brownfields, Along with High Social Vulnerability Index Score



ACRES = Assessment, Cleanup, and Redevelopment Exchange System. CDC = Centers for Disease Control and Prevention. EJSCREEN = Environmental Justice Screening and Mapping Tool. EPA = Environmental Protection Agency. OZ = Opportunity Zone. QOZ = Qualified Opportunity Zone.

Source: EPA-Enhanced Qualified Opportunity Zones. ArcGIS Feature Layer by U.S. Environmental Protection Agency. https://epa.maps.arcgis.com/home/item.html?id=01e8be27c317405fb7cdb17e4857b707 l?id=01e8be27c317405fb7cdb17e4857b707l?id=01e8be27c317405fb7cdb17e4857b707

Exhibit 7

EPA's Opportunity Zone Data on Tracts in Lorain, Ohio

Opportunity Zone Data	Project Area: Lorain, OH	Broader Area: Great Lakes Areas of Concern
Percent Tracts that are Food Deserts	50.0	22.5
Median EJSCREEN Demographic Index	85.0	80.9
Percent Tracts that have Impaired Waters	100.0	52.2
Total Number of Brownfields	29	933
Total Population	15,309	872,403

EJSCREEN = Environmental Justice Screening and Mapping Tool. EPA = Environmental Protection Agency.

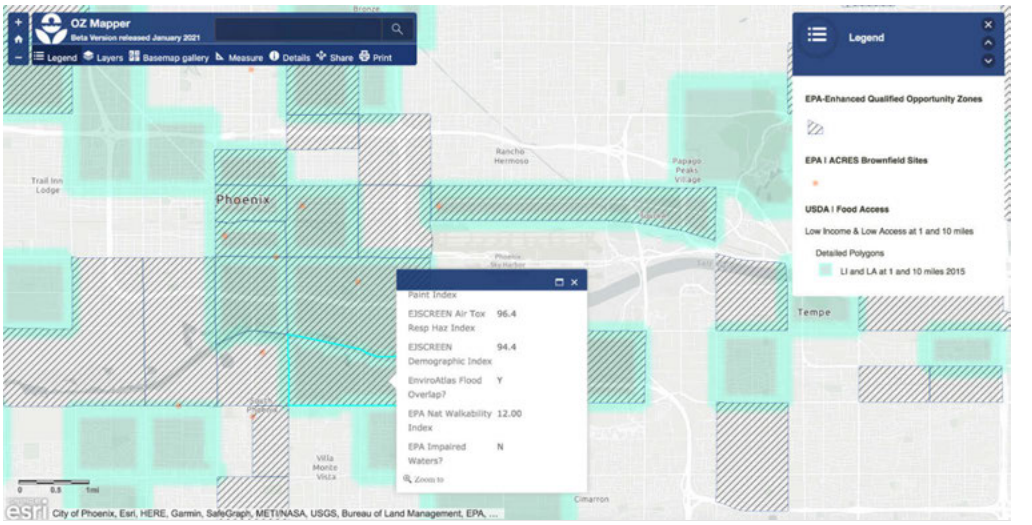
Source: EPA-Enhanced Qualified Opportunity Zones. ArcGIS Feature Layer by U.S. Environmental Protection Agency. https://epa.maps.arcgis.com/home/item.html?id=01e8be27c317405fb7cdb17e4857b707

Phoenix, Arizona

Phoenix is one of the municipalities included in the Rio Reimagined (for the Rio Salado, or Salt River) coalition, the most recent Urban Waters Federal Partnership designation (EPA, n.d.c). Along the Rio Salado are opportunities to improve the environmental and economic conditions, including in South Phoenix, where a developer plans to redevelop the former Del Rio landfill site into an agri-food innovation center. The plan aligns with the needs in the QOZ tract and the surrounding area, which has limited food access (exhibit 8) and low-income residents and notably high percentile scores on the EJSCREEN Demographic Indicators and Air Toxics Assessment Respiratory Hazard Indices (exhibit 9).

Exhibit 8

Visualization of Planned Agribusiness for Food Desert and Low-Income and Minority Area



ACRES = Assessment, Cleanup, and Redevelopment Exchange System. EJSCREEN = Environmental Justice Screening and Mapping Tool. EPA = Environmental Protection Agency. LA = low access tract. LI = low income tract. OZ = Opportunity Zone. USDA = U.S. Department of Agriculture.

Exhibit 9

EPA's Opportunity Zone Data on Tracts in Phoenix, Arizona

Opportunity Zone Data	Project Area: Del Rio Fresh Site	Broader Area: Phoenix, AZ
Total Number of Brownfields	-	16.0
Median EJSCREEN Demographic Index	94.4	91.3
Percent Tracts that are Food Deserts	100.0	35.6
Total Population	3,181	185,862

EJSCREEN = Environmental Justice Screening and Mapping Tool. EPA = Environmental Protection Agency.

Source: EPA-Enhanced Qualified Opportunity Zones. ArcGIS Feature Layer by U.S. Environmental Protection Agency. https://epa.maps.arcgis.com/home/item.html?id=01e8be27c317405fb7cdb17e4857b707

Developing Tools to Scale Support for Economically Distressed Communities

Through the pilot technical assistance and the OZ Mapper, OCR learned more about community concerns and priorities related to OZ and developed tools to help these and other communities align funding for and attract investment to align with community priorities. These tools have evergreen utility for communities seeking to attract investment and leverage public-sector funding to support community wealth building. They are available online.[3]

- **The Community Prospectus Development Tool** outlines a seven-step process for developing a community prospectus, with strategies and case study examples that promote equity, sustainability, and thriving communities. It uses a question-driven approach to develop a prospectus that facilitates community wealth building. The asset-based approach recognizes existing cultural, social, and environmental assets and identifies investments to build on those assets.

- **Leveraging Development Finance Tools to Attract Opportunity Zone Investment** provides an overview of various development finance tools and how communities can use those tools to finance projects located in Opportunity Zones.

- **The Engaging Investors Quick Guide** includes key information about OZ investors and ideas for engaging with them in equitable community development projects.

Because most QOZs are economically distressed, the OZ Mapper dataset and tool also inform EPA's understanding of trends in environmental and health challenges faced by disinvested and underserved communities in general. Those data have been shared across EPA and with interagency partners at the Census Bureau, the Economic Development Administration (EDA), and USDA.

Recognizing Implications for Community Revitalization Work at EPA

Only a few years have passed since QOZs were designated, but there is more to learn about the investments in QOZ. How do these investments affect communities, and how do federal programs serve community needs? Although Opportunity Zone investments can fill critical gaps in capital for projects, many communities with QOZs were not poised to take full advantage of them. One key area in which EPA/OCR and its federal partners can address those needs is by facilitating connections and planning processes through which communities identify state and federal resources that can address their specific community needs. Public-sector resources can be catalytic, supporting community priorities and attracting additional capital. Another critical strategy for attracting private investors is site readiness and identifying what public investment and partnership are needed to remove barriers—Brownfields Assessment, Community Development Block Grant (CDBG) funds, and EDA funds, for example.

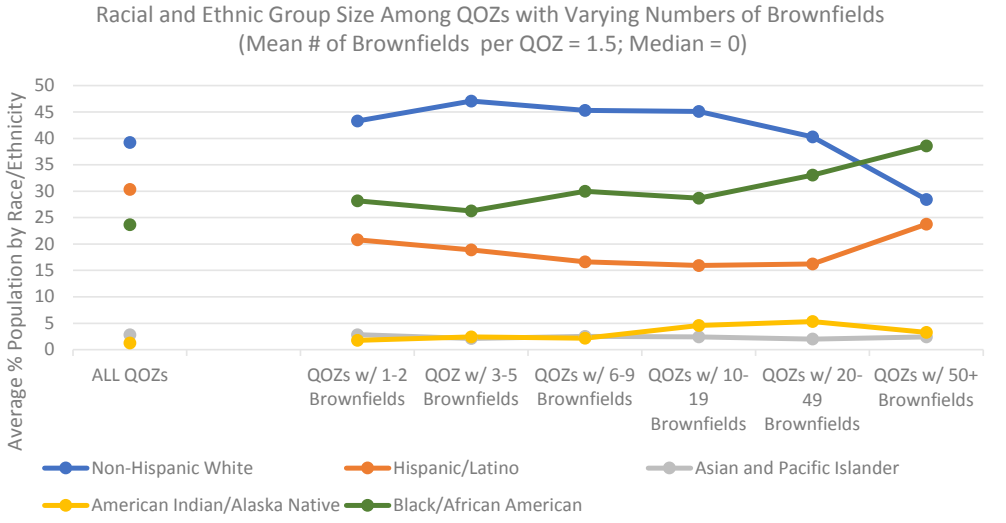
[3] https://www.epa.gov/smartgrowth/leveraging-opportunity-zones-community-revitalization

Understanding both the profiles of the community (using the OZ Mapper, for example) and the profiles of the community coalition is important. Applying the frame of the eight forms of capital—built, natural, cultural, political, financial, individual, intellectual, and social—can guide stakeholders toward solutions that include attracting financial resources, such as private investment through a Qualified Opportunity Fund (QOF), and solutions that are rooted in the community (WealthWorks, n.d.). In addition, communities can draw on and prioritize local assets to build community wealth.

As the EPA conducts further analysis of the data from the OZ Mapper, the representativeness of the QOZs and the ability to reach intended populations with appropriate resources comes into focus. Although the data combined and visualized as part of the OZ Mapper supported EPA and its partners in understanding trends across different geographic groupings of OZ tracts, as one considers QOZ tracts and their eligibility requirements, this sampling of 8,600+ low-income tracts also offers opportunities to enhance the understanding of the needs of economically distressed areas across the United States. When EPA's Enhanced Qualified Opportunity Zones dataset is joined with other data from the same period and geography, differences can be observed (EPA, 2021). For example, although a clear majority of QOZs do not have any brownfields, as designated by EPA's ACRES database, some QOZs have several and others more than 150 (EPA, n.d.b). A review of data on the number of brownfields per QOZ aligned with race and ethnicity data from the American Community Survey reveals that QOZs with high numbers of brownfields tend to have more African-American residents than do other QOZs (exhibit 10). The African-American population in those tracts is also larger than the average size of those groups across all QOZ tracts.

Exhibit 10

OZ Mapper Data on African-American Populations as Overrepresented in QOZs with Assessment, Cleanup, and Redevelopment Exchange System (ACRES) Brownfields



OZ = Opportunity Zone. QOZ = Qualified Opportunity Zone.

Source: EPA-Enhanced Qualified Opportunity Zones. ArcGIS Feature Layer by U.S. Environmental Protection Agency, 2021. https://epa.maps.arcgis.com/home/item.html?id=01e8be27c317405fb7cdb17e4857b707. American Community Survey, 2015-2019, Table B03002

As EPA continues its multisector approach to community revitalization, these data uncover key findings. In QOZ tracts that contain floodplains, the proportion of non-Hispanic White population is higher (42 percent) than average among all OZs (39 percent). By comparison, the proportion of African-American population is relatively lower (24-percent average across OZs and 21-percent average in OZ tracts with floodplains). Although further analysis is needed to determine the significance of those trends, the finding points to a potential disparity that EPA can address by combining economic development and flood mitigation efforts in communities that may be underserved by initiatives such as Opportunity Zones. This finding points to new research questions and new users of these data, as EPA plans to further develop this tool with added emphasis on understanding the environmental and health needs of the country's economically distressed communities.

EPA's community-driven approach to community revitalization also recognizes and requires steps of blending data such as these with on-the-ground community perspectives to ensure that they are put to best use in supporting sustainable and equitable development.

Understanding Opportunities and Limitations with Place-Based Federal Designations

EPA exercised its interdisciplinary coordination, data and mapping, and community technical assistance in support of Opportunity Zones, with most of OCR's activity ramping up in 2019. Those efforts built on the learnings and staffing structures of previous cross-agency, place-based initiatives and necessitated additional topical education, coalition building, and thoughtful integration with core EPA programs. States were charged with developing an Opportunity Zone designation process with their communities— and, after governors made their official QOZ determinations, states, local governments, tribes, and territories learned about the benefits, rules, and policies supporting Opportunity Zones. Place-based initiatives help direct investment, attention, and assistance to disadvantaged communities, and new designations can refresh and refocus long-standing coalitions or plant the seeds for new coalitions to form. At the same time, place-based designations come with overhead or administrative costs that could be streamlined and maintained. The community- and data-driven approach the EPA takes points to the types of work federal agencies can anticipate for future place-based efforts and could be more consistently supported across agencies. With limited data available, the anecdotal evidence from working with communities suggests that benefits are available to communities with QOZs that are independent of QOF investments, such as strengthened partnerships, improved and refined economic development plans, and increased federal support for underinvested communities.

Exhibit 11

List of Data Fields Included in OZ Mapper and EPA-Enhanced Qualified Opportunity Zones Feature Layer

Data Layer	Source	Enhanced Map Layer	OZ Mapper Visualization
# of RCRA Corrective Actions Within OZ tract	EPA NEPAssist	X	X
# of Toxic Release Inventory Facilities Within OZ tract	EPA TRI	X	X
Air Quality Non-Attainment: CO (1971 Std)	EPA		X
Air Quality Non-Attainment: Lead (2008 Std)	EPA		X
Air Quality Non-Attainment: NO2 (1971 Std)	EPA		X
Air Quality Non-Attainment: Ozone 8-hr (2015 Std)	EPA		X
Air Quality Non-Attainment: PM10 (1987 Std)	EPA		X
Air Quality Non-Attainment: PM2.5 Annual (2012 Std)	EPA		X
Air Quality Non-Attainment: SO2 1-hr (2010 Std)	EPA		X
Census Tract Number	Census	X	
OZ Tract Population	Census ACS 2018	X	X
County			
Current Asthma Crude Prevalence (%)	CDC PLACES 2020		X
EJSCREEN Air Toxics Respiratory Hazard Index	EPA EJSCREEN	X	
EJSCREEN Demographic Index	EPA EJSCREEN	X	
EJSCREEN Lead Paint Index	EPA EJSCREEN	X	
EPA | Impervious Surface (%)	EPA EnviroAtlas		X
EPA 100-Year Floodplain	EPA EnviroAtlas		X
EPA Grants Awarded from 2013–2020	EPA		X
EPA Regions	EPA	X	X
EPA Tribal Areas	EPA	X	X
FEMA 100-year Floodplain	FEMA	X	X
Green Space (%)	EPA EnviroAtlas		X
Impaired Waters	EPA	X	
Impervious Surface (%)	EPA EnviroAtlas		X
Internet Connectivity	Census ACS 2019	X	X
Limited Food Access	USDA		X
Medically Underserved Areas & Populations	HRSA	X	X
National Park Service (NPS) Areas	NPS	X	X
National Risk Index	FEMA 2020	X	X
National Walkability Index	EPA	X	X
Number of Brownfield sites	EPA ACRES	X	X
Number of Superfund sites	EPA SEMS	X	X
OZ Tract Type (Low-Income or Contiguous)	U.S. Treasury	X	
Protected Areas & State Parks	NPS		X
Rural Area Designation	USDA	X	
Social Vulnerability Index (SVI)	CDC SVI 2018	X	X
State			
SVI Housing & Transportation	CDC SVI 2018	X	X
Underground Storage Tank Facilities	EPA		X

Acknowledgments

The authors would like to thank our partners in developing the OZ Mapper: Alex O'Neill and Kim Balassiano, U.S. Environmental Protection Agency Office of Mission Support, Office of Information Management, Information Access and Analysis Services Division; our technical assistance co-lead Jennifer Hirsch, formerly U.S. Environmental Protection Agency, Office of Community Revitalization; our collaborators and colleagues in the Regional OZ Lead community of practice; and our community technical assistance partners, including Brooklyn Holton (Wenatchee), Daffney Moore (St Louis), Tom Brown and Tiffany McClelland (Lorain), Roseanne Albright and Juan Batres (Phoenix), Miranda Maupin (Skeo Solutions), Katie Kramer (Council of Development Finance Agencies), Mike Taylor (Vita Nuova).

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Tax Cuts, Jobs, and Distributed Energy: Leveraging Opportunity Zones for Equitable Community Solar in the D.C. Region

Sara Harvey

Abstract

Federally designated Opportunity Zones(OZs) can serve a key function in meeting the United States' climate and energy goals while spurring economic growth and upward mobility for low-income groups. However, the unclear eligibility criteria and cross-jurisdictional nature of the 2017 Tax Cuts and Jobs Act complicates its implementation when maximizing co-benefits is a priority. This capstone seeks to capture the ways in which federally designated OZs can be utilized to achieve equity-focused clean energy outcomes in the Washington, D.C.-Maryland-Virginia region. In the few years since the legislation was implemented, jurisdictions have tested its boundaries to create additional positive outcomes for constituents and the natural environment. Utilizing existing climate plans and clean energy infrastructure in the District of Columbia (D.C.) as a case study, the author argues that Opportunity Zones can and should serve as a vehicle to achieve our region's climate goals. This article recommends policy changes to resolve barriers to entry and encourage community-invested solar projects that reduce utility costs, create jobs, and provide value to investors.

Introduction

Qualified Opportunity Zones (QOZs), as defined in the 2017 Tax Cuts and Jobs Act, provide local governments the opportunity to spur equitable investments in low-income communities by allowing jurisdictions to designate 25 percent of low-income census tracts for capital gains tax breaks (IRS, n.d.). The successes and limitations of the 2017 Tax Cuts and Jobs Act have yet to be fully explored in the program's 4 years and with broad implementation. Many municipalities have continued to grapple with the realities of climate change and its impact on our infrastructure systems. To study this complicated issue for cities and their residents more holistically, this article focuses on the potential to pair solar incentives with Opportunity Zones in the D.C. metropolitan

region. When Opportunity Zones are paired with local clean energy incentives and creative financing mechanisms, it is possible to achieve the economic development goals of the QOZ program while also investing in our collective climate future.

Our present moment requires a swift move from extractive and outdated fossil fuel infrastructure toward distributed renewable clean energy systems that benefit the region's communities and environment as well as reinforce its resilience to storm damage and cyberattacks on the grid. The D.C.-Maryland-Virginia region, hereafter referred to as the D.C.-MD-VA metropolitan region, has grappled with meeting its energy needs as its energy production system has had to adapt to market forces. This article is timely because of the ambiguity of the QOZ program regulations and the breadth and depth of potential social solutions for which it can assist. Pairing existing incentives and tweaking policies to reduce barriers can open the door to a more equitable clean energy future for all.

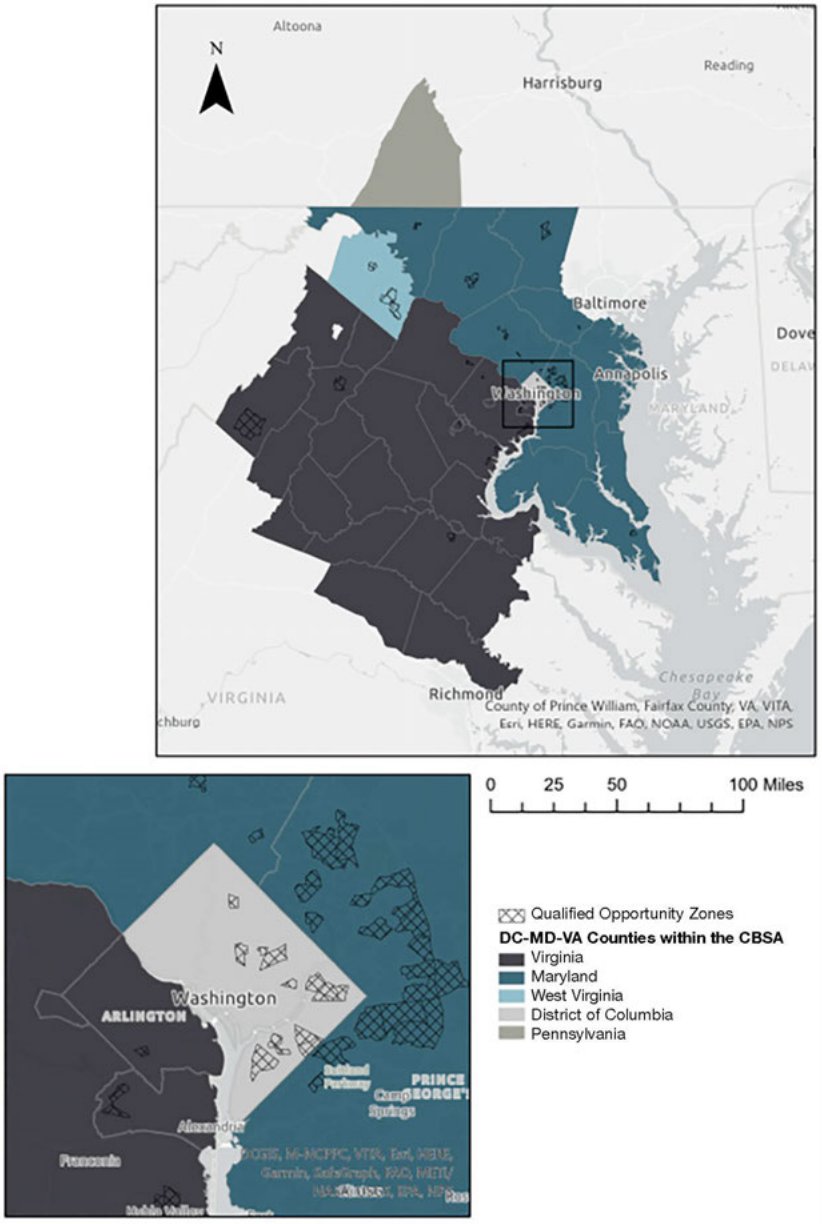
Clean Energy and the Local Policy Landscape

Although research has been conducted on tax incentives relating to solar energy and Opportunity Zones separately, little has been done to pair these two opportunities. At the time of this article's publishing, the legislation creating the federal Opportunity Zone program has only been in effect for 4 years; however, the program's tax incentives are fully realized after 10 years of investment. On the other hand, considerable attention has been paid to the proliferation of distributed renewable energy sources as technology has improved, costs have been cut, and policies have been implemented.

The purpose of including Opportunity Zones in the 2017 Tax Cuts and Jobs Act is to promote economic development through long-term private investment in low-income census tracts. Once the law was enacted, investors were encouraged to reinvest capital gains into a census tract given the QOZ federal designation (see exhibit 1) (Cohen and Haradon, 2018). The Metropolitan Washington Council of Governments (MWCOG) has designated broader low-income areas of the region similarly through its Equity Emphasis Areas as part of its environmental justice analysis for the Visualize 2045 long-range transportation plan (exhibit 2).

Exhibit 1

QOZs in D.C.-Maryland-Virginia-West Virginia CBSA and Jurisdictional Boundaries

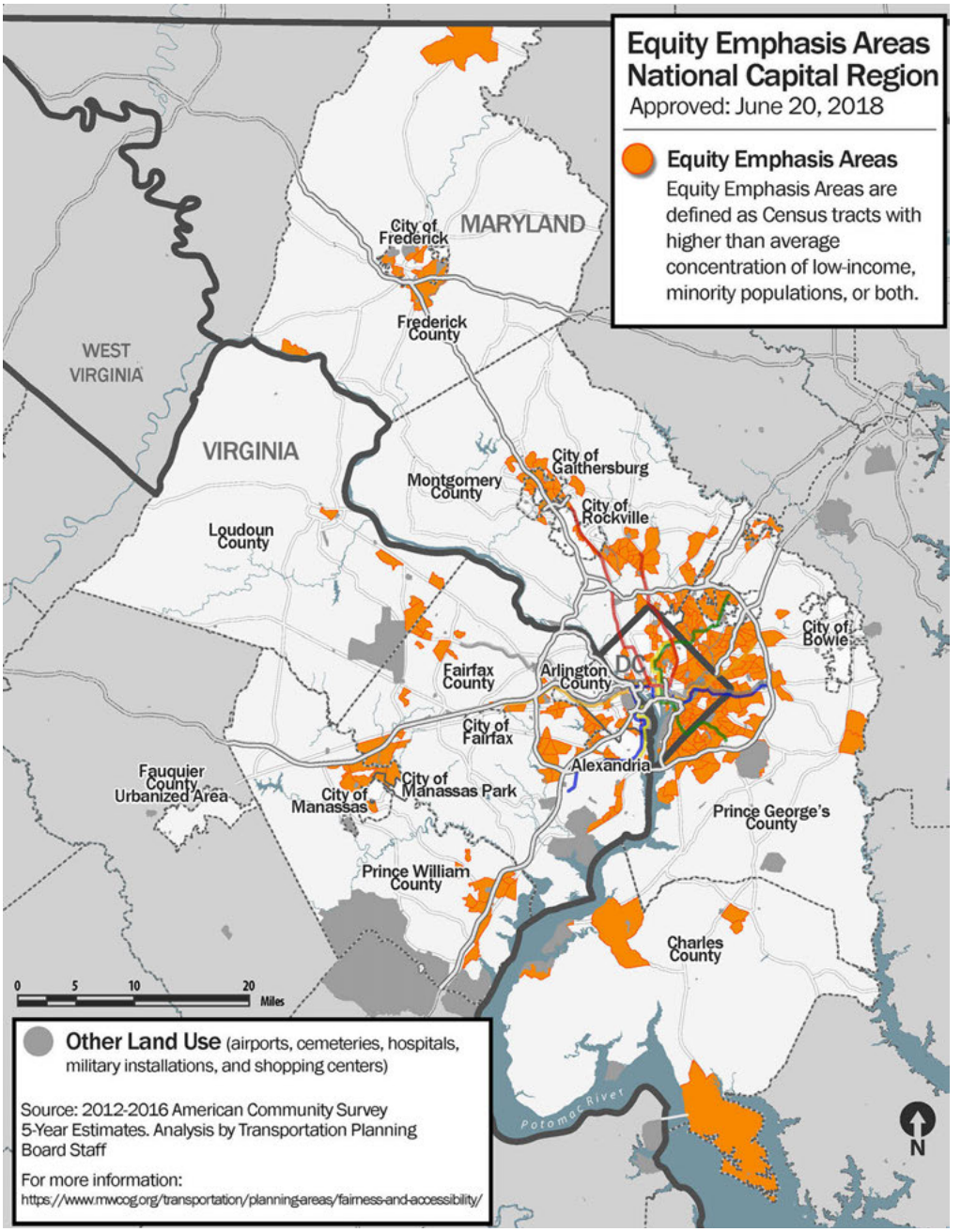


CBSA = Core Based Statistical Area. QOZs = Qualified Opportunity Zones.

Sources: Maps created by the author; County Boundaries provided by West Virginia Department of Transportation, University of Virginia, and Maryland Department of Transportation; CBSA provided by the U.S. Census Bureau; Opportunity Zones data courtesy of the U.S. Department of the Treasury

Exhibit 2

MWCOG Approved Equity Emphasis Areas



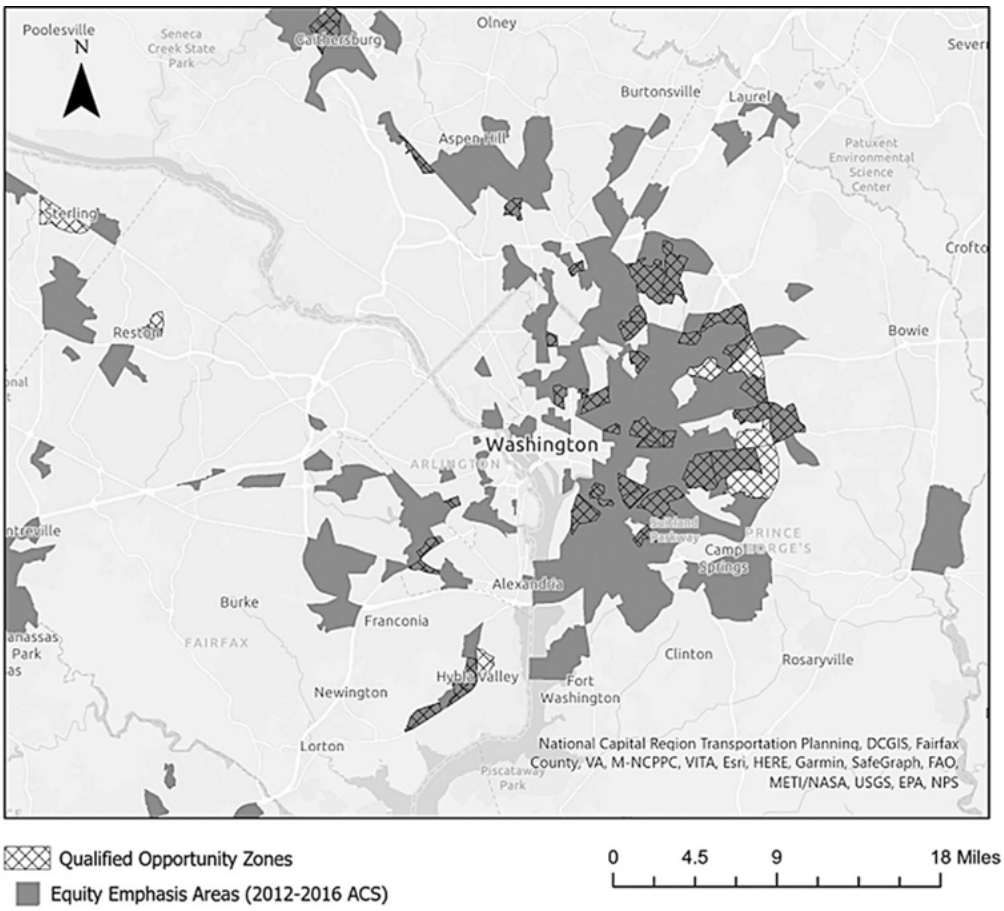
MWCOG = Metropolitan Washington Council of Governments.

Source: Metropolitan Council of Governments Transportation Planning Board. 2018. Washington, D.C.. https://www.mwcog.org/assets/1/6/Region.pdf

For a census tract to be considered a QOZ, the states, the District of Columbia, and other U.S. possessions nominate the tracts for designation. The tracts then get approved by the U.S. Treasury Department, whereas the Equity Emphasis Areas rely on additional demographic factors such as race and age (Cohen and Haradon, 2018). Comparing these two policy objectives can be helpful in assessing how federal and local priorities are aligned (exhibit 3).

Exhibit 3

Opportunity Zones Compared with Equity Emphasis Areas



Sources: Map created using ArcGIS online, data clipped to CBSA boundaries; Opportunity Zones data courtesy of the U.S. Department of the Treasury; Equity Emphasis Areas provided by GIS@MWCO

When it comes to clean energy investments, development generally can be accomplished through the developer creating a Qualified Opportunity Fund (QOF). In this case, the QOF would provide developers with additional sources of investment capital and more access to ideal clean energy sites (Jewett, 2019). Because the program is so new and formal guidance about the affected parcels outside the OZ designation has been open ended, combining incentives with other renewable energy programs creates problems for tax planning and inefficiencies due to deduction limits

(Jewett, 2019). Outside the Opportunity Zone program exist a variety of incentives meant to spur clean energy deployment. Many of these incentives are focused on barriers to market entry; such incentives include tax deductions/credits, rebates for materials, grants, and performance-based incentives. It is important to note that these incentives can often be utilized for adjacent technologies, such as energy storage and investments into energy efficiency, both of which can further the energy savings and contribute to achieving additional green building objectives. Those efforts also benefit low-income census tracts, which historically spend a higher proportion of their income on energy.

From a local policy standpoint, D.C. is expected to save an estimated $45 million on the city government's electric bills over the next 20 years, thanks to one such agreement (Hauslohner. 2015). When clean energy and energy efficiency incentives are passed along to utility consumers on a larger scale, communities can benefit by developing new industries, improved livelihoods through energy access and lower pricing in low-income communities, and broadly expanded economic development for the D.C.-MD-VA region. Bundled incentives do the best job of maximizing these benefits to investors and consumers at all levels (Dinçer, 2011). The scope of this study is restricted to photovoltaic (PV) power systems for ease of comparison; ease for combination with other community benefits, such as affordable housing or energy storage; and reliability of data for measuring solar radiation levels and sunshine hours, which are imperative for the design of a solar energy conversion system (Dinçer, 2011). Over the past decade, the distribution of PV solar arrays has increased significantly because of increasing retail energy costs throughout the country, the decrease in the costs associated with installation, and a growing carbon trading and renewable energy credit market throughout the country (Varghese and Sioshansi, 2020). When PV is paired with energy storage investments, the project becomes more profitable due to increased reliability and lower dependence on seasonal solar availability.

Implementing climate and energy policy across the D.C. metropolitan region has largely included voluntary action options and flexible implementation levels due to the challenges of different governmental structures, population levels, and income distribution across the two states and D.C. (MWCOG, 2017). In 2017, MWCOG adopted the Regional Climate and Energy Action Plan, which included a number of benchmarks for local jurisdictions to grow their local clean energy economy as their economies and populations grow in tandem (exhibit 4). MWCOG acknowledges that public and private action is necessary for the clean energy revolution. In its regional Climate and Energy Plan for 2017–2020, MWCOG's Climate, Energy and Environmental Policy Committee argues that local resources and support play a role in reducing market uncertainties and barriers and providing financing solutions that encourage private investment (MWCOG, 2017).

Exhibit 4

Metropolitan Washington Council of Governments Local Climate Actions Tracker

Activity	Percentage of MWCOG Jurisdictions Taking this Action by 2020
Adopt environmentally preferable purchasing policies to facilitate public purchasing of goods and services that reduce impacts on human and environmental health	100%
Increase the percentage of government spending on climate-friendly products and services	100%
Encourage government vendors and businesses in the community to minimize the carbon intensity of their supply chain	25%
Commit to divest in fossil fuels over the long-term	25%
Support vocational training for the clean economy	25%
Update economic development workforce plans/policies to incorporate strategies to support emerging green or cleantech industries	25%
Develop a cleantech branding and marketing strategy	25%
Provide shared space and develop incentives for green/cleantech businesses to locate within the jurisdiction	25%
Expand opportunities for minority and women-owned businesses to participate in clean economy initiatives	25%
Support innovative technology and infrastructure deployment to address current community challenges and needs	25%
Support state and federal incentive programs for green and cleantech activities	25%

MWCOG = Metropolitan Washington Council of Governments.

Source: Metropolitan Washington Council of Governments. Regional Climate and Energy Action Plan, *2017: 28*

The District of Columbia government has a number of programs specifically targeted at growing renewable energy resources throughout their jurisdiction. These policies, including the Renewable Portfolio Standard Expansion Amendment Act of 2016, all stem from the District's Sustainable D.C. initiative. Sustainable D.C. aims to establish goals and targets for responding to climate change, including a commitment to reducing greenhouse gas emissions by 50 percent below 2006 levels by 2032 and 100 percent by 2050 (DOEE, 2020). The Renewable Portfolio Standard Expansion Amendment Act of 2016, also known as the Solar for All Program (Solar for All), focuses on the expansion of solar capacity and market penetration throughout the District and providing low-income households, small businesses, nonprofits, and seniors with access to locally sourced, low-cost renewable energy. Specifically, the Solar for All program aims to provide solar to 100,000 low-income households and reduce their energy bills by 50 percent by 2032. Eligible District residents can participate in Solar for All single-family solar or community solar options if the household income is below 80 percent of the area median income (AMI) threshold. The program has encountered problems meeting its goal because not many low-income households in the District pay electric bills due to other relief programs. This circumstance has expanded Solar for All's strategy to provide additional benefits to those households that cannot take advantage of credits on their energy bills.

The Renewable Energy Development Fund (REDF) was established as a special-purpose revenue fund specifically for community solar projects in D.C.. Funding for the project comes from compliance fees from electricity suppliers, which also creates a market for Solar Renewable Energy Credits (SRECs), as they can be purchased in lieu of paying the fee (DOEE, 2020). This program has had difficulty securing commitments from business owners as site access must be guaranteed for a period of 15 years. Community engagement has also been an issue due to the lack of consumer information and education about the benefits of solar to low-income communities (DOEE, 2020).

Research Methodology

To fully grasp the scope of potential populations in need of clean energy investments, the research for this article began with geospatial analysis of designated QOZs in the D.C.-MD-VA region, as defined by the Census Core-Based Statistical Area, overlaid with MWCOG's Equity Emphasis Areas and Opportunity Zones. After QOZs and clean energy assets are established, the author will delve deeper into a comparative analysis between existing projects and potential sites for new community solar development in these QOZs that could provide broader benefits to the surrounding community. The analysis will then show how anchor institutions, such as public and low-income housing, can help to identify several areas that should be explored to establish the kind of partnership in which social equity, PV output, and financial incentives are matched to reduce costs for consumers and increase economic mobility in disadvantaged regions of the study area.

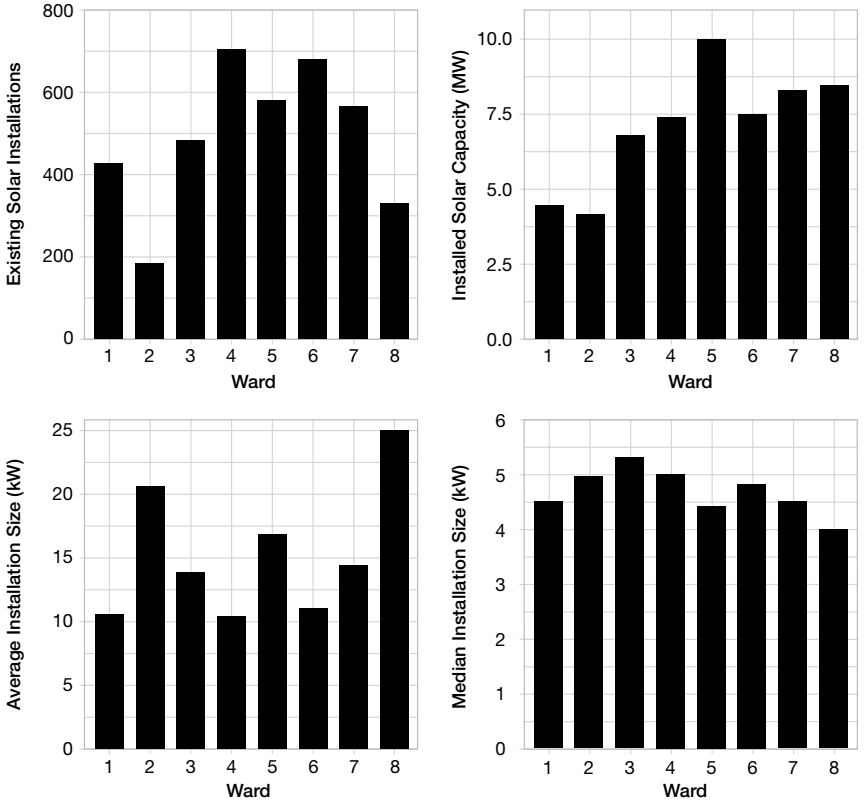
Research Findings

The economic disparities within the District of Columbia follow a similar pattern to the surrounding region (see exhibit 3). Within the District of Columbia, all QOZs are also within the boundaries of some of MWCOG's Equity Emphasis Areas, showing the potential for additional positive externalities to the surrounding areas with similar legacies of poverty and disinvestment. This overlap occurs most frequently in the eastern and southeastern quadrants of the city, in Wards 7 and 8, respectively. Similarly, residents of Wards 7 and 8 often bear the District's highest energy bills but have the fewest resources. A report from Groundswell found that solar energy projects in the area could save residents 10 percent or more on electricity costs. These savings can be further increased when paired with home energy efficiency or weatherization improvements, benefiting low- to moderate-income households (Groundswell, 2019).

In May 2020, Synapse Energy Economics, Inc., produced a feasibility study that advocates for the program's extension on the basis of an analysis of the District's Renewable Portfolio Standards (Camp et al., 2020). The document also identifies the strengths and weaknesses of each ward regarding renewable energy proliferation (exhibit 5). This information, along with the spatial analysis illustrated in exhibit 3, led the author to prioritize Wards 7 and 8 for QOZ solar investments.

Exhibit 5

Renewables Generation by District of Columbia City Ward



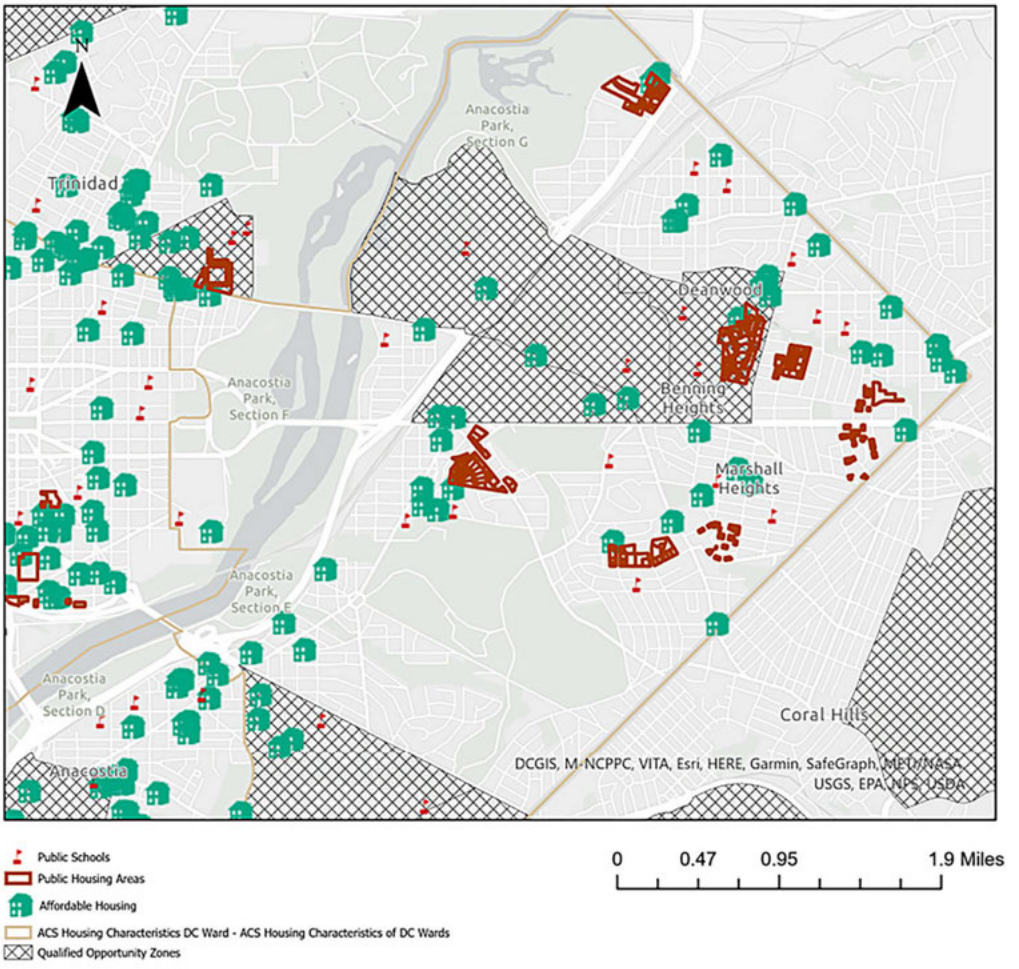
kW = kilowatt. MW = megawatt. PV = photovoltaic.

Sources: Erin Camp, Ben Havumaki, Thomas Vitolo, and Melissa Whited. Future of Solar PV in the District of Columbia*; adapted from D.C. PSC, "List of Eligible Renewable Generators.xlsx," and Open Data D.C.*

Exhibits 6 and 7 illustrate the spatial relationship between Opportunity Zones, District subsidized affordable housing properties, public housing owned by the District, and high schools in Wards 7 and 8. These structures were chosen as the anchor institutions for this study because the District's limited land inventory and rising land costs make land purchases more arduous. To reap additional benefits, energy policy best practices provided by the National Association for the Advancement of Colored People (NAACP) provide a standard for workforce development integration.

Exhibit 6

Ward 7 QOZs and Anchor Institutions

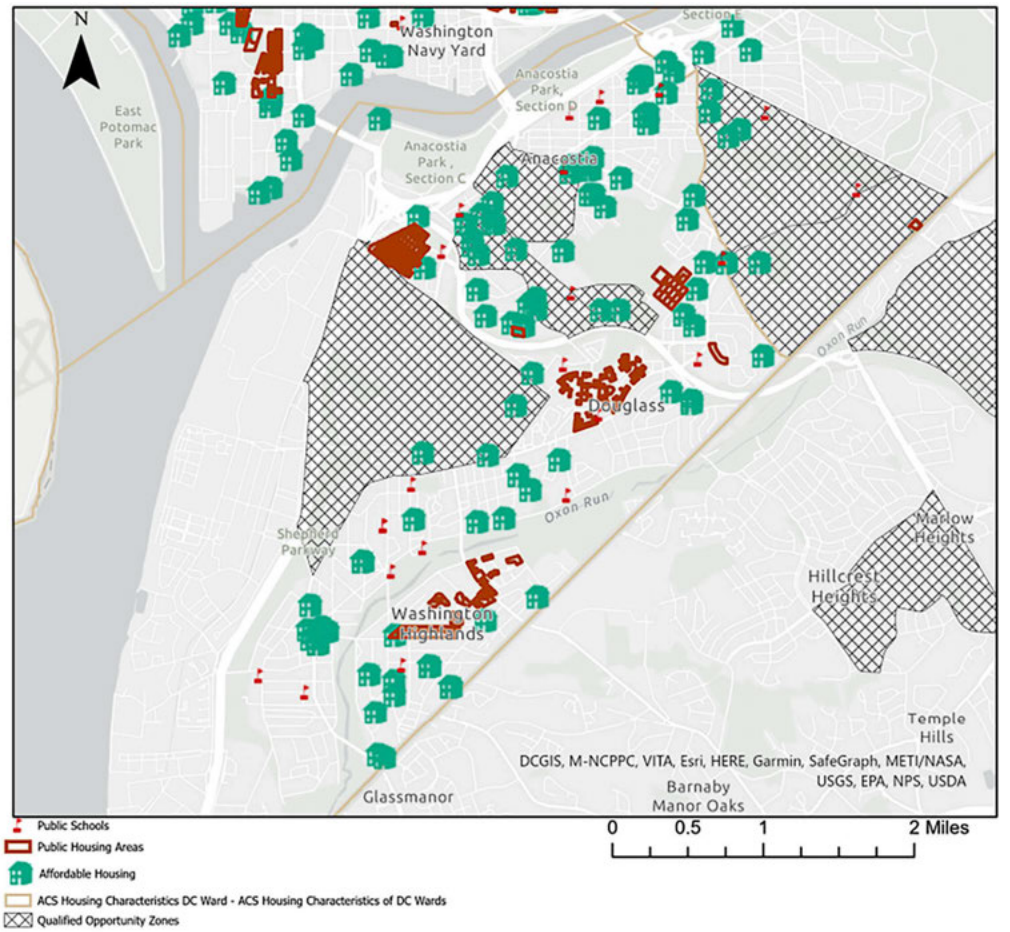


ACS = American Community Survey. QOZs = Qualified Opportunity Zones.

Sources: Map created by author; high school, public housing, and affordable housing data provided by DCGISopendata; Opportunity Zones data courtesy of the U.S. Department of the Treasury; Equity Emphasis Areas data provided by GIS@COG

Exhibit 7

Ward 8 OZ Anchor Institutions



ACS = American Community Survey. QOZs = Qualified Opportunity Zones.

Sources: Map created by author; high school, public housing, and affordable housing data provided by DCGISopendata; Opportunity Zones data courtesy of the U.S. Department of the Treasury; Equity Emphasis Areas data provided by GIS@COG

The NAACP has created a Just Energy Policy Guide to integrate workforce training into renewable energy projects and suggest policies that increase majority ownership by minorities in these companies. Suggested policies for equitable energy enterprises included in the NAACP's 2017 report include local hiring standards to keep project revenues within the communities they are expected to support, as well as the establishment of a Disadvantaged Business Enterprise (DBE), which is at least 51 percent "owner-operated and controlled by individuals who identify with specific ethnic minority, gender, disability, and other disadvantaged group classifications" (Franklin, Alksnis, and Younger, 2017). These businesses are typically certified by an outside organization, such as the National Minority Supplier Development Council or a government agency.

Although the District of Columbia has programs that certify small businesses for preferential selection in contracting, D.C. does not have a specific program targeted at minority-owned firms. The author contends that access to solar projects is out of reach for low-income individuals due to high upfront costs, a lack of solar-ready structures, and inequitable access to training and education in these technologies. The D.C. government could bring about greater access to the benefits of solar power for low-income individuals by ensuring better coordination among organizations. Through a Community Benefits Agreement (CBA), the developer and the community can enter into a legally binding agreement that can help to bridge this gap through the support of workforce training programs that already exist at the District's high schools and community centers. This educational infrastructure exists throughout the D.C.-MD-VA region alongside nonprofit workforce training partners, such as GRID Alternatives, which already has a range of successful projects in D.C., Maryland, and Virginia.

Recommendations

The Solar for All D.C. program has made great strides in connecting capital funders, nonprofits, and low-income households to create community solar projects. This work has already begun in the areas of the city most in need of lower utility bills, affordable housing, and access to job training and economic opportunities for minority-owned businesses through CBAs. Based on the research and analysis presented in the previous sections, the author recommends four actions that can help to pair incentives locally in a way that can be scaled to other jurisdictions in the region: (1) unification of anchor institutions, (2) collaborative funding mechanisms, (3) workforce training, and (4) connected marketing strategies.

Recommendation 1: Formalize the network of anchor institutions to maximize co-benefits so that schools and subsidized government housing complexes can build symbiotic relationships that connect residents, students, and the broader community to the benefits of collectively owned solar and the job opportunities this field provides. The District currently has all the various pieces of this sort of program at its disposal, but the network of connections is still missing. A public-private partnership between the solar industry and local governmental entities is needed to provide workforce training that connects residents to this growing industry in their communities.

Recommendation 2: Explore opportunities for nonprofit funding partnerships through impact investing and public-private partnerships. Solar Qualified Opportunity Funds have been adapted in other jurisdictions with success, although with limited margins of return. A study by the Urban Institute in June 2021 found that it was difficult for many solar QOZ projects to find qualified investors but that mission-based investing has proven fruitful for addressing those gaps (Theodos et al., 2020). Exhibit 8 lists projects that currently exist through this kind of partnership wherein the funder provides the initial capital for the project and monetizes the energy, and the nonprofit partner leases its rooftop over the agreement period and benefits from a negotiated portion of the proceeds.

Exhibit 8

Existing Community Solar Projects

Capital Funder	Public/Nonprofit Partner	Households Served	Govt. Program	Output	Solar Types	Lifetime Energy Savings	Project Lifecycle
Groundswell	Dupont Park Seventh-Day Adventist Church	47	Solar for All D.C.	168 kW	Rooftop, parking lot canopy	$470,000	20 years
GRID Alternatives Mid-Atlantic	DCGS, DOEE, Oxon Run Community	750	Solar for All	2.65 MW	Ground-based solar farm	$500/household/year	15–25 years

DCGS = D.C. Dept of General Services. DOEE = Department of Energy and Environment. kW = kilowatt. MW = megawatt.
Sources: D.C. Department of Energy and Environment. n.d.; Groundswell, n.d.

Recommendation 3: Incorporate workforce development at high schools and majority-minority- and minority-owned businesses that are local to the jurisdiction to increase the social impact of these projects. Currently, the D.C. region is home to the first Black-owned community solar company, WeSolar, based in Baltimore, Maryland (Givens, 2020). Incorporating workforce development and solar business leadership opportunities to the communities served can not only help to increase the impact of a project but also help to drive meaningful economic growth to the area and open doors for additional partnerships that may otherwise be unavailable.

Recommendation 4: Market incentives and programs as a package for different groups. Because these programs have the potential to affect the community at large, it is essential to market these incentives as a package of benefits for everyone. Exhibits 9 and 10 are some examples the author created of how these co-benefits could be emphasized more in future branding and program development.

Exhibit 9

OZs for Equitable Clean Energy Community Explainer

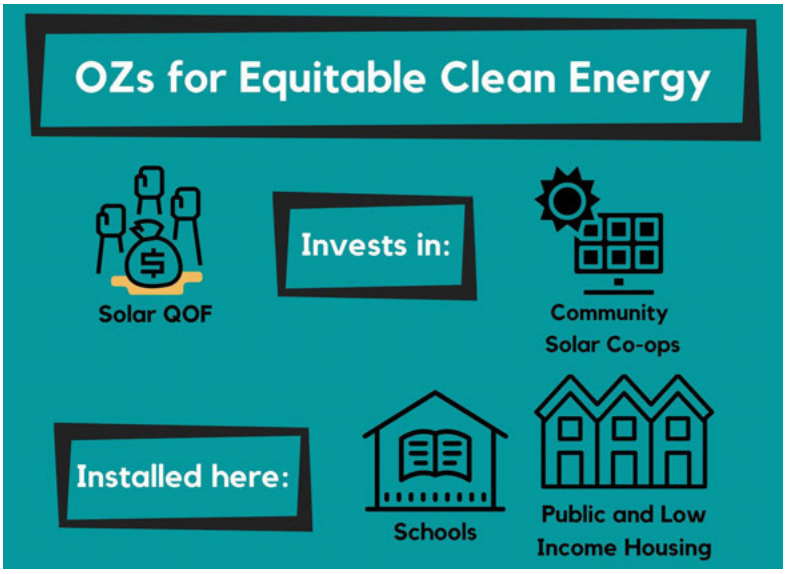


Exhibit 10

OZs for Equitable Clean Energy Community Benefitsr

Conclusion

The federal Opportunity Zone incentive program created by the 2017 Tax Cuts and Jobs Act can play an important role in creating equitable growth in communities that often get overlooked by private and public investments. Although many state and federal incentives help to ease the burden of affording solar for individuals, there is still a gap between how our lowest income neighborhoods access these resources. The D.C.-MD-VA region has been a leader in the United States for including clean energy resources in its urban contexts and providing opportunities for future generations to get involved in the green economy.

As identified in this article, there is a missing connection between individual and public benefits in the eyes of constituents for community solar projects and how they relate to broader equitable development outcomes of QOZs. Local governments need to better explain the interconnections between our energy system, our environment, and our collective economic future. If we as a community can start measuring the benefits of these projects holistically by linking anchor institutions, social programs, and networks of funders, we can create linkages between our programs, decrease redundancy, and make connections between our lived environment and our societal aspirations.

Acknowledgments

The author would like to thank the URP Department at Georgetown University for their guidance on the original capstone from which this article was adapted.

Author

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Census Tract Boundaries and Place-Based Development Programs

Joseph Fraker

Abstract

Place-based economic development programs are often tied to census statistical units, such as census tracts. These units allow for the precise allocation of program benefits to areas with certain underlying socioeconomic conditions. During the 2020 decennial cycle, some local governments and metropolitan planning organizations sought to alter these units to change areas eligible for place-based Opportunity Zone incentives. Although criteria for modifying census tract boundaries are strict and have been consistent for decades, those efforts illuminate a potential conflict between the needs of data users and the desires of some who stand to benefit from place-based incentives. By interviewing people familiar with the Census Bureau's process for revising statistical boundaries and through conversations with people in the economic development field, this report aims to better understand this potential issue.

Introduction

As part of the 2020 Census, some local governments and metropolitan planning organizations successfully rearranged census statistical geographies (census tracts) with the intent of expanding areas eligible for Opportunity Zone tax incentives (Buhayer and O'Neal, 2021). The strategy was suggested by then-senior Trump administration officials as a way to potentially increase the size of eligible Opportunity Zone tracts. Some local governments and metropolitan planning organizations then pursued the tract redrawings, which were approved in the fall of 2020. Upon taking office, the Biden Administration ruled that the Opportunity Zone boundaries will remain the same as when first designated, curtailing the efforts to expand the size of the zones in these cases.

The episode raised questions and concerns from academics, policymakers, and local government officials around the country.

It shows the potential "unintended consequences of the decision to use tracts as Opportunity Zone units," noted David Van Riper, Director of Spatial Analysis at the Institute for Social Research and Data Innovation at the University of Minnesota and one of the principal investigators of the

National Historical Geographic Information System, a project that facilitates the comparison of geostatistical data at varying units over time (Van Riper, 2021). Van Riper noted that census tract boundaries, although intended to be fairly permanent, undergo changes from decade to decade, but he is unaware of tracts being changed for economic development purposes.

This article attempts to get at a few questions. First, it briefly examines the implementation geographies of place-based programs. It then looks at the census tract as a geographical and statistical unit, focusing on the decennial process for revising tracts known as the Participant Statistical Areas Program (PSAP) to better understand the purpose of the census tract and the processes by which they are determined. This analysis includes a review of a survey sent out to select PSAP participant organizations about their practices and procedures for drawing and modifying boundaries. Next is a case study from Baltimore County, Maryland, where tracts were redrawn at the request of the county government to expand one of the Opportunity Zones to encompass a large, multimodal logistics hub. The report concludes with a discussion about the potential implications of this effort.

This report aims to answer these questions by consulting with economic development and policy experts and by interviewing those familiar with the Census Bureau's decennial PSAP program for determining census tract boundaries. The overall goal of the research is to shed light on this rather innovative approach to potentially receiving place-based economic incentives.

Implementation Geographies for Place-Based Programs

Place-based programs can be implemented at any number of geographies with varying shapes and sizes. They can range from something as small as a commercial corridor for Tax Increment Financing, to county and city boundaries, to locally defined and drawn lines for the Federal Choice Neighborhoods program, to census statistical geographies for others. Census tracts provide the added benefit of facilitating analysis of underlying socioeconomic conditions in the targeted areas through the annual data release of the American Community Survey (ACS), which provides statistically valid population samples at the tract level. Increasingly, Congress has used geographical units, including the census tract, to implement policy. The quality of ACS data and the underlying geographies they utilize are vital for the distribution of federal funding (Reamer, 2018).

For some place-based programs that rely on census tracts, the program boundaries shift annually as the underlying data from the ACS get retabulated. A census tract that once qualified as low income or high poverty, for example, may gain wealth or vice versa, taking it in or out of a program. This is the case with Qualified Census Tracts and Difficult Development Areas for the Low-Income Housing Tax Credit (LIHTC). For others, such as Empowerment Zones, the program boundaries are static to the underlying tracts at the year of implementation. As the Biden administration recently ruled, the Opportunity Zone program will also be static to 2010 census tract geographies.

Overall, many of these federal and state economic development programs that use census tracts as the underlying implementation unit aim to increase jobs and investment in disadvantaged areas through incentivizing private investors, businesses, and governments with interests in the zones.

The decision to tie these programs with census tracts allows for easier monitoring of the program impacts. Census tracts also generally roughly follow neighborhood boundaries and homogenous geographies, so they are useful units for targeting programs in areas with specific socioeconomic conditions. The targeting of economic development programs, such as the Opportunity Zone program, to census tracts is made possible by the local governments and metropolitan planning organizations and by the Census Bureau applying consistent and accurate criteria for drawing census tracts across the country through PSAP.

What is the Census Tract, and What Is PSAP?

The foundations of the census tract unit were first conceived by Dr. Walter Laidlaw in 1906. Laidlaw was the Director of the Population Research Bureau of the New York Federation of Churches, and he wanted a way to accurately determine population characteristics for congregations in New York City (Krieger, 2006). Existing ward boundaries were "surely political—purely around getting votes—and there was no real consistency. There was no real unit that would allow you to compare populations over time," noted Professor Nancy Krieger at the Harvard T.H. Chan School of Public Health, who agreed to be interviewed for this report (Krieger, 2021). Krieger is an epidemiological researcher whose work focuses on the societal determinants of public health, and she has written about the history of the census tract. Laidlaw wanted a nonpolitical way to compare populations with "reasonably similar social and economic characteristics over time," Krieger said.

By 1910, eight cities, with the assistance of the Census Bureau and at the urging of Laidlaw, implemented the country's first "sanitary areas" to measure population characteristics, primarily to plan for public health (Truesdell and Green, 1937). In 1927, public health researcher Howard Whipple Green expanded on Laidlaw's work and implemented the first citywide census tract schema in Cleveland, which had been adopted by a total of 18 cities by the 1930 census. Green referred to the push for cities to adopt census tracts as a "movement" in his 1934 Census Tract Manual, which he prepared for the Census Bureau (Truesdell and Green, 1934).

For "tracting" these initial cities, "census tract committees" were formed consisting of local organizations that would likely use the data in cooperation with the Bureau of the Census (Truesdell and Green, 1934). The initial guidelines for tracts stated that the boundaries should be "definite" and should typically follow centers of streets and, occasionally, rivers or railroad lines. They should also be between 3,000 and 8,000 persons in total. Each committee was to have a leader, or "key person," who should have "a considerable amount of tact and diplomacy" to find compromise between data users. The leader should be knowledgeable of the use of population data in the city and be familiar with government, business, academic, and welfare interests (Green, 1947).

Initially just used for measuring public health characteristics, such as disparities in mortality rates, uses of tract data expanded as other disciplines and governments began seeing them as an important way to continually monitor social and economic change (Green, 1947). In 1934, the Census Bureau officially standardized the methodology for census tracts, allowing for their increased use for determining school populations and the locations of police and fire districts, recreation facilities, and housing. These uses, Green noted, were predicated on having consistent

and relatively homogenous characteristics in each tract, noting that "any one tract should not originally include areas with widely dissimilar characteristics" (Green, 1947: 10).

The governments that implemented census tracts continued to grow throughout the 20th century. By the 2000 census, every part of the country was covered in these data tabulation units (Krieger, 2021). Over the past few decades, the census tract has increasingly been used for direct resource allocation in the form of public policy implemented at the tract level. The homogeneity of tracts and the consistent data they provide make analysis and allocation easier and tailorable. "You want them to be meaningful units that you are comparing over time," says Krieger. "They were meant to be free of political influence and of market influence" (Krieger, 2021).

A review of the history of census tracts indicates that the criteria used to define tracts have remained relatively consistent from the 1930s to the present. Tracts should still follow visible features such as roads and rivers, and they should include between 1,200 and 8,000 people. According to the Federal Register, "The primary goal of the census tract is to provide a set of nationally consistent small, statistical geographic units, with stable boundaries, that facilitate analysis of data across time."[1] This goal, however, may come into conflict with a community's planning process if place-based economic development creates strong incentives for boundary changes that could inject instability into the data series.

The Participant Statistical Areas Program (PSAP)

The Census Bureau now utilizes the Participant Statistical Areas Program (PSAP) to delineate these statistical areas, work formerly done by the census tract committees and census statistical area committees (U.S. Census Bureau, 2008). PSAP allows invited participants from state and local governments and regional planning agencies to review and modify census statistical boundaries, including tract boundaries. The Census Bureau recommends that invited participants reach out to data users and stakeholders in this process (U.S. Census Bureau, 2008).

These statistical geographies are used to tabulate data from the census, economic census, ACS, and other potential Census Bureau surveys (U.S. Census Bureau, 2020). This process is not quite as intensive as it may have been in the past because most jurisdictions are usually not drawing tracts from scratch; it can, however, still be an involved process, especially in areas with substantially changing populations. In these areas, the Census Bureau encourages tracts that have gained population to split and those that have lost population to merge, allowing the outer boundaries of tracts to retain their shapes (U.S. Census Bureau, 2020).

Before the 2000 census, formal committees were required as part of the process, and they were asked to provide local agencies, private citizens, and organizations with the opportunity to engage (U.S. Census Bureau, 2008). The primary participant organization, often a metropolitan planning organization or county, is still required to ensure that the process is open to all who would like to participate, but the primary participant takes more of a leading role (U.S. Census Bureau, 2008).

[1] "Census Tracts for the 2020 Census—Final Criteria," *Federal Register* 83 (219) November 13, 2018. https://www.govinfo.gov/content/pkg/FR-2018-11-13/pdf/2018-24567.pdf.

During the 2020 PSAP process, the Census Bureau simplified things by providing PSAP primary participants with pre-delineated tract geographies in their Geographic Update Partnership Software (GUPS) mapping software that utilized the base 2010 tracts, with modifications where there were substantial population changes. The groups could either accept or make modifications to the Census Bureau's proposals in the GUPS system on the basis of local data needs and preferences (U.S. Census Bureau, 2020).

According to the final criteria for delineating 2020 census tracts published in the Federal Register, "the goal of the criteria has remained unchanged; they assure comparability and data reliability through the standardization of the population thresholds for census tracts, as well as requiring that tracts' boundaries follow specific types of geographic features that do not change frequently."[2] One of the more significant ways in which the criteria have changed happened in 2010, when housing units could be used in place of population to better reflect areas with seasonal populations, such as resort towns.[3]

Although there are fairly strict criteria for drawing tracts, there is room in the guidelines for local governments and planning organizations to make changes.[4] The Federal Register criteria do not mention drawing tracts in a way that makes certain areas eligible for federal programs and other areas not. The criteria do state, however, that "the Census Bureau may modify and, if necessary, reject any proposals for census tracts that do not meet the published criteria."[5] A webinar on PSAP does note the following: "We [the Census Bureau] recognize that statistical geographies, census tracts especially, are used in a variety of federal programs; those attempting to want to change boundaries to meet the needs of a particular program, please be aware that a change that may have a positive effect for one program may have a negative impact on another" (U.S. Census Bureau, 2019). The webinar continues: "It is better to maintain the statistical objectivity and comparability of areas, updating areas to meet the general analytical needs of as many data users as possible" (U.S. Census Bureau, 2019). According to Tim Trainor, President of the International Cartographic Association and former U.S. Census Bureau official, the Census Bureau, "does not make a change if it (a census tract submission) is in conflict with the criteria." (Trainor, 2021). This statement indicates that although the Census Bureau may not look favorably upon submissions that aim to change tract geographies on the basis of tax incentives, it is not a hard rule of the Bureau, and local governments and planning organizations have some discretion.

PSAP Respondents Survey Questions

To better understand how PSAP works and how local governments and metropolitan and regional planning organizations approached the process in 2019 when PSAP groups were conducting this work for the 2020 Census, the author emailed a survey to 15 PSAP primary participants. The survey included three questions on procedures and standards for PSAP. The survey was sent out

[2] Ibid.

[3] Ibid.

[4] Ibid.

[5] Ibid.

in April 2021 and represents some of the largest metropolitan areas across the country. The survey results are summarized in exhibit 1.

Exhibit 1

PSAP Survey Results

Survey Question	Summary of Responses
1. Other than the Census Bureau, who do you consult with in the PSAP process (local governments, community organizations, citizens, etc.)?	Six respondents stated they worked with local governments and municipalities within their jurisdiction, and one did not respond directly to the question. There was variable participation among local governments, with some participating in the process and others leaving it to the primary participants. One primary participant stated they worked with other regional planning agencies if they had overlapping boundaries with particular counties. None of the primary participants indicated they worked with citizens or community groups.
2. Do you defer to local governments if the local governments have recommendations for changes?	The answer to this question was generally yes. If the local government had requests for changes, the primary participant tried to accommodate those requests. Three primary participants emphasized that they defer to local governments only if the boundary modifications followed the Census Bureau criteria. In some instances, participants indicated there was some back and forth over a geographical feature to use as a boundary or how to better align a tract with a neighborhood, for example.
3. Did you feel any pressure to draw census tracts in a way that might not be in keeping with the guidelines from the Census Bureau?	Five of the seven respondents stated that they did not feel pressure to violate the Census Bureau criteria. Some groups indicated that they would not have accepted submissions that violated the criteria. One group expressed surprise that tracts could be exploited for the Opportunity Zone program at all, and another group declined to answer.

PSAP = Participant Statistical Areas Program.

Source: Author communication with PSAP participants between March 2021 and May 2021

In addition to providing the answers outlined here, primary participants gave some additional details into their methodology. One participant indicated that there may have been instances in which Opportunity Zones would have expanded due to tract changes, but those changes would have been incidental and would have also had to conform with the designated criteria for boundary adjustments. Others repeatedly mentioned that they would accept changes only if they complied with the Census Bureau standards for boundary adjustments. One group stated, "The idea that census tracts could be gamed for exploiting the Opportunity Zones [2017 Tax Act] seems far-fetched—simply because it would take so many, many [sic] years to change the boundaries thru Census's once/decade update, then wait 2–3 more years for socioec [sic] data to become available." Another group said, "The case studies described in the Bloomberg article are certainly concerning and problematic. I feel fortunate that we didn't experience any such egregious attempts to influence the outcomes."

Case Study: Baltimore County, Maryland

In Baltimore County, a representative for Tradepoint Atlantic—a massive, multimodal logistics facility in eastern Baltimore County—met with county officials to request that the Sparrows Point peninsula tract, the tract that underlies Tradepoint Atlantic, be merged with the adjacent low-

income community and designated Opportunity Zone of Turner Station so that Tradepoint Atlantic could qualify for Opportunity Zone tax incentives. The strategy, which Trump administration officials had suggested, was a way to get around the characteristics that made the Sparrows Point tract ineligible to begin with; it was a zero-population census tract and not a low-income community (O'Neal, 2021). With the suggestion in hand, Tradepoint asked Baltimore County to have the tracts merged as part of the 2020 PSAP process. The request came after the county had already submitted its 2020 PSAP tract boundaries to the Baltimore Metropolitan Council, the local regional planning agency and primary PSAP participant, without merging the tracts. The county then revised its submission.

Although the idea never materialized in terms of the Opportunity Zone because of the Biden Administration's decision that changes in tracts will not affect Opportunity Zone boundaries, it did result in a substantially changed census tract. One side of Bear Creek represents the low-income and historic African-American community of Turner Station, and the other side overlies the massive, global logistics hub and regional economic success story of Tradepoint Atlantic. Unlike some other areas that have experienced similar declines and have stagnated, the former industrial site at Sparrows Point has experienced success since the 2010s, having had an impressive and rapid turnaround, facilitated by the 2014 purchase of the 3,300-acre peninsula by a privately held limited liability corporation (Tradepoint Atlantic, 2021). In the years since the purchase, and with help from Baltimore County in the form of $78 million in funding, the company has cleaned up the site and turned it into a massive, multimodal logistics hub (Wood, 2018). It is now home to multiple Amazon and Home Depot warehouses, Volkswagen, Floor and Décor, the urban produce producer Gotham Greens, the offshore wind company Orsted, and many others (see exhibit 3). As of the fall of 2020, Tradepoint Atlantic estimated 8,000 employees were working at a total of 20 companies on the site, and Tradepoint Atlantic will have an estimated 17,000 jobs by 2025 (Tradepoint Atlantic, 2020). The area is once again a center for regional commerce, employing people from around the Baltimore metropolitan area.

Turner Station developed as an African-American community on the other side of Bear Creek from Sparrows Point in the early part of the 20th century. African-Americans were barred from living in the surrounding residential communities of Dundalk and Middle River, and there was only a small portion of the Bethlehem Steel company town on Sparrows Point where African-Americans could live (Pitts, 2019). With limited opportunities elsewhere, Turner Station grew as a major center for African-American culture and commerce in the Baltimore area and the country. Several notable residents have called Turner Station home, including Henrietta Lacks, astronaut Robert Curbeam, Jr., and Congressman Kweisi Mfume (Pitts, 2019).

Although the neighborhood of Turner Station is linked with Sparrows Point in the sense that many of its residents worked at the steel mill and some now work at the Tradepoint Atlantic site, the two areas are divided by a major tributary of the Patapsco River and an interstate highway, geographical features that often divide tract boundaries. The tracts are on two separate peninsulas. There is also no direct transit access between Turner Station and Tradepoint Atlantic. The trip by car between the two areas is between 4 and 8 miles, depending on where on the sprawling Sparrows Point tract one is heading. Until it was changed during the 2020 redrawing, Sparrows Point was a Special Use

Census Tract because of its unique geography as an employment center with no housing units. It was precisely this unique geography and classification as a zero-population census tract that meant it could not qualify as an Opportunity Zone to begin with as the Opportunity Zone program requires certain household income thresholds to qualify for selection.

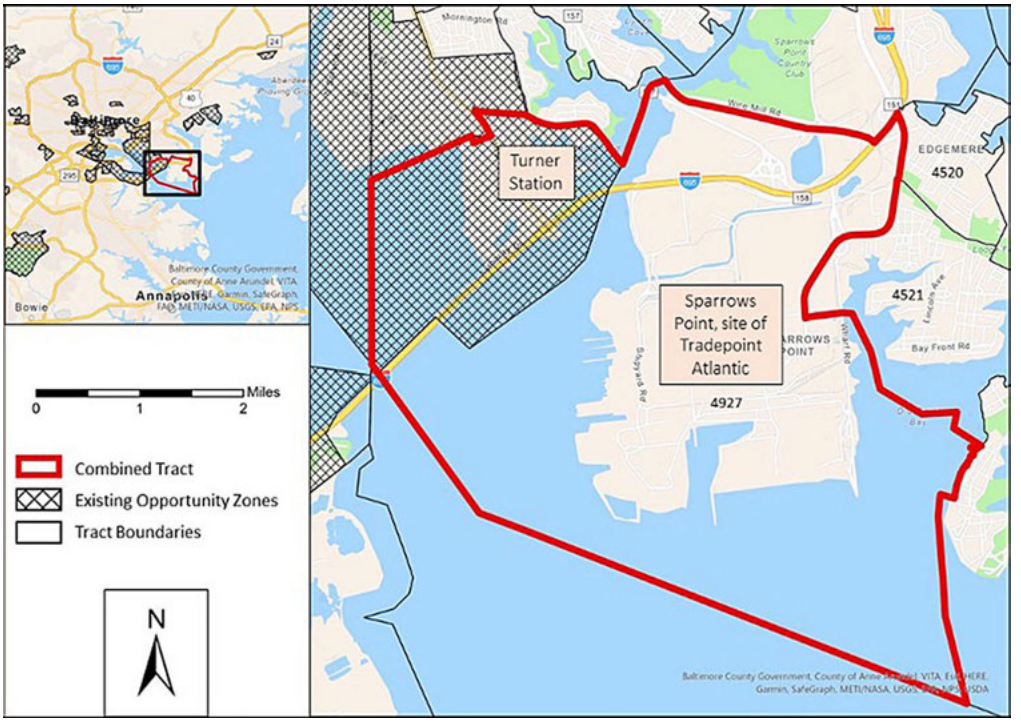
Some, including Congressman Dutch Ruppersberger, who represents the area, argued that extending the Opportunity Zone to include Tradepoint Atlantic was "entirely consistent with the purpose and intent of the Opportunity Zone program."[6] Other lawmakers have suggested sunsetting certain tracts with similar characteristics to the Sparrows Point area—that is, census tracts that qualify by being adjacent to low-income communities (O'Neal, 2021). Senator Ron Wyden, for example, has proposed eliminating eligibility for contiguous tracts and tracts with high incomes, the former of which Sparrows Point would have been had it been a population census tract. In addition, the Sparrows Point and Tradepoint Atlantic area is among the types of areas others have said should not qualify—areas already seeing significant investment without implementing the program. This point, of course, has become moot since the news came out that the Opportunity Zones will remain stagnant to the 2010 boundaries.

The previous example proves the lengths to which investors and some governments will go to help businesses receive the tax incentives. If Baltimore County only wanted to eliminate a zero-population census tract, it would have made more sense to merge with tract 4520 or tract 4521 on the same peninsula, says Van Riper. Those two tracts are not low-income communities and did not qualify as Opportunity Zones, however, so Tradepoint Atlantic and Baltimore County looked to the distressed census tract and low-income community across the creek (See exhibit 2).

[6] O'Neal, Lydia. 2021. [@LydsONeal]. 2021 (March 29). "Rep. Ruppersberger (@Call_Me_Dutch) has asked @SecYellen to allow a tax-advantaged Opportunity Zone in the Baltimore area to expand based on redrawn census tract lines, so that it includes an industrial project—one example of a nationwide phenomenon @USTreasury has to address." [Tweet]. Twitter. https://twitter.com/LydsONeal/status/1376559925686599683.

Exhibit 2

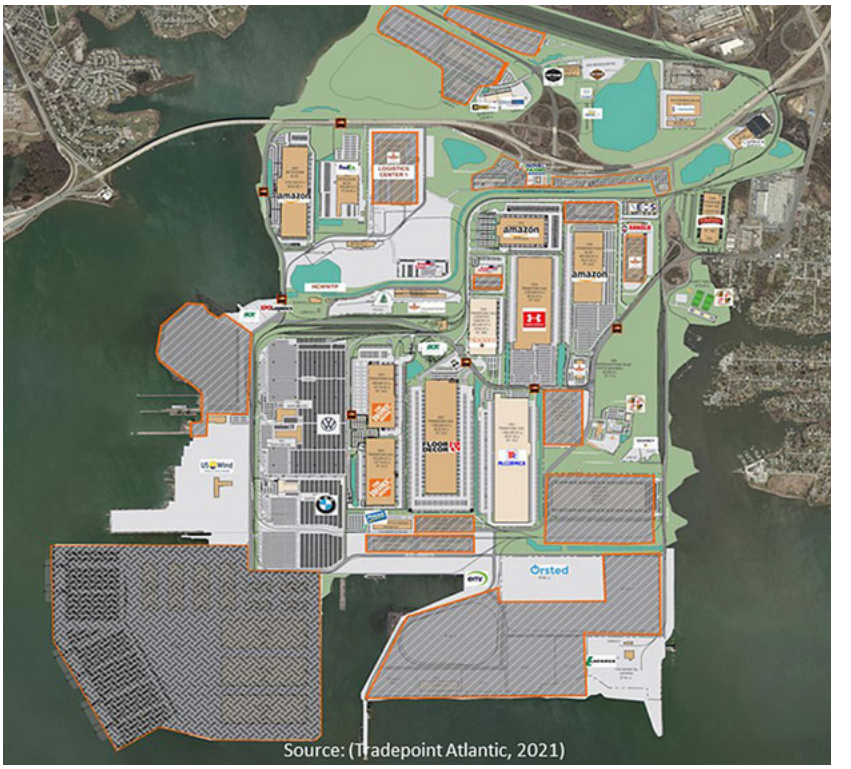
Map of Existing Opportunity Zones in the Baltimore Area and the Census Tract Expansion at Sparrows Point–Tradepoint Atlantic



Sources: Esri World Navigation Map (Esri, n.d.); Maryland Department of Housing and Community Development (MD iMAP Data Catalog [DOIT], n.d.); U.S. Census Bureau, Geography Division, n.d.

Exhibit 3

Detailed View of Tradepoint Atlantic that Shows Current and Future Development Sites



Source: Tradepoint Atlantic, 2021

Discussion

To get a better sense for how researchers and practitioners view the strategy of rearranging tract boundaries to make certain areas eligible for place-based programs, additional interviews were conducted for this report. In these interviews, there was a consensus that tracts should only be adjusted if the underlying statistics or geography merits it.

Even among those who would like to see the Opportunity Zone program expanded to include more areas, there was little appetite for adjusting statistical geographies for that purpose. Kenan Fikri of the Economic Innovation Group, the 501-C4 organization behind the initial push for an Opportunity Zone-like program, stated that allowing Opportunity Zones to expand if the underlying statistics do not merit it would be inappropriate. There is an argument to be made, according to Fikri, that the new 2020 tracts would have better represented on-the-ground statistics and neighborhoods. Even so, he says, if a jurisdiction was just "drafting off" or "looping in whatever they wanted to, regardless [of] whether or not it looks, feels, smells, and counts as a low-income community, that's not what you want" (Fikri, 2021).

Andrew Reamer, Professor at the George Washington University Institute for Public Policy, whose research focuses on economic development and competitiveness, offered similar sentiments. "I wasn't aware of this subject and certainly would be concerned if census tract lines are redrawn to enhance tax benefits," he said (Reamer, 2021). Reamer's work includes analysis of the federal economic statistical programs and uses and users of American Community Survey data. When asked if this sort of thing has happened in previous decennial census cycles for other place-based programs that rely on census tracts, he said that he was unaware of any such occurrences (Reamer, 2021). Ned Hill, Professor of Economic Development at Ohio State University, stated similar sentiments (Hill, 2021).

Dr. Kurt Usowski, Deputy Assistant Secretary for Economic Affairs with the U.S. Department of Housing and Urban Development's Office of Policy Development and Research (HUD PD&R) stated that he was not aware of any instances of this strategy being employed for the LIHTC program, stating that the "time horizon for implementing such a solution would most likely be outside the risk tolerance for even real estate developers" (Usowski, 2021). Dr. Michael Hollar, Senior Economist with HUD PD&R stated that while he was aware of developers occasionally contacting the Census Bureau, he did not know of any specific instances or what was discussed. He noted that if it were a request to modify a tract boundary, it would have been "quickly denied" (Hollar, 2021).

The process of drawing and revising census tract boundaries every 10 years is esoteric. This obscurity is probably because, unlike many functions with the census, PSAP is largely administrative, conducted by those in governments and governing bodies with expertise in statistics and demographics. It is also unclear in this research if it is common for local governments to request input from nongovernmental groups or the public. From the primary PSAP participant responses for this research, it appears as though it is not, with primary PSAP participants mainly soliciting input from local governments.

From a local government perspective, Rich Quodomine, Senior Lead Geographic Information System (GIS) Analyst with the Department of Public Property for the City of Philadelphia and member of the American Association of Geographers, notes that changes in tract boundaries for non-statistical purposes would have a significant and disruptive impact on transportation resource planning (Quodomine, 2021).

A couple of the discussions for this report revealed an underlying sense that changing tract or other statistical geographies for political or economic development purposes is probably not uncommon. Quodomine noted that some local governments have historically tried to influence the naming conventions of metropolitan statistical areas, for example, as benefits can be associated with name recognition or pride associated with living in an area. "The manipulation of the census," he notes, "is probably as old as the Census going back to 1790" (Quodomine, 2021). Others noted generally that even data get politicized in one way or another.

From a data analysis perspective, changes in tract boundaries create issues for those looking to compare data over time. Researchers, including those who work on this topic at the Minnesota Population Center, have created workarounds for this issue, developing the National Historical

Geographic Information System (NHGIS), which allows for the comparison of different tract geographies going back to 1990. NHGIS provides geographic "crosswalks" that allow for the comparison between census units (Manson et al., 2020). This comparison becomes difficult when changes to tract footprints happen, which is why Census Bureau set standards for splitting or merging tracts to retain outer boundaries.

Conclusion

As evidenced through the case study in this article and the research by Buhayer and O'Neal (2021), the Opportunity Zone program and other place-based programs may provide the incentive to draw tracts in a way that connects low-income areas with areas seeing or likely to see development that would qualify them for incentives given to distressed tracts. There also may be an incentive to draw tracts that are larger in geography.

Efforts to expand Opportunity Zones through this process failed because of the decision to keep the zones unchanged to 2010 tract boundaries. The attempt, however, has implications for data users and for other federal programs that rely on accurate population counts. "You name the discipline; they use census tract data," says Professor Nancy Krieger. "We want the units to be meaningful for the work that we do (Krieger, 2021)."

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Community Land Trusts for Sustainably Affordable Rental Housing Redevelopment: A Case Study of Rolland Curtis Gardens in Los Angeles

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The views expressed are those of the authors and do not necessarily reflect the views of the Council of the District of Columbia or others in the District of Columbia Government.

Abstract

Community land trust (CLT) affordable housing projects are typically built in rural or economically depressed urban neighborhoods. In the midst of urban housing shortages and anti-gentrification organizing, local groups are turning to the CLT model to redevelop affordable housing in expensive urban centers and enable low-income households to remain in their communities and maintain access to jobs, services, and cultural amenities. This case study focuses on the synthesis of skills and strategies it took for a land trust and an affordable housing developer to join forces and transform 48 units of Section 8-funded apartments with expiring affordability covenants into 140 units of sustainably affordable housing. In addition to increasing the number of affordable units, most critically, the CLT's ground lease design will help ensure their affordability indefinitely, unlike mainstream affordable housing projects. This study also identifies public policy changes that could facilitate similar projects and discusses the enduring challenges associated with the development of affordable housing in expensive market economies.

Introduction

Community land trusts (CLT) have become a nationwide movement. They are one promising strategy for providing land uses undersupplied by our market economy, including affordable housing and the preservation of open space. To date, most CLTs have been in rural areas or in depressed urban neighborhoods where acquiring land is relatively inexpensive. This case study focuses on how a land trust and an affordable housing developer partnered to redevelop affordable housing in a high-priced neighborhood in Los Angeles that has experienced substantial redevelopment and gentrification.

The Rolland Curtis Gardens complex (RCG) was originally built as 48 units of Section 8-funded affordable housing in 1981. The property sits within the Exposition Park neighborhood of Los Angeles, just west of the University of Southern California's main campus. When the site's affordability covenants were about to expire in 2011, a local land trust, T.R.U.S.T. South LA (TRUST)[1] teamed up with an experienced affordable housing developer, Abode Communities, to purchase the property from the private owner and redevelop it into 140 new housing units that will stay affordable in perpetuity. When the new Rolland Curtis Gardens opened in 2019, renters who had lived at RCG and had been relocated during construction used their "first right of return" to move into the new complex, which now includes recreational space, a community-oriented health center, and a retail store.

This case study examines the factors that allowed Abode Communities and TRUST to successfully redevelop the RCG complex. In doing so, the study identifies the extent to which this strategy for redeveloping affordable rental housing and preserving their affordability is replicable in other expensive urban markets and gentrifying areas.

CLTs and the Need for Urban Affordable Rental Housing in the United States

Research about CLTs has been growing in response to the growing housing affordability problem in the United States. Research has shown that starting in the 1990s, rent prices continued to rise while renters' incomes stagnated (Collinson, 2011; Myers and Park, 2019). By 2011, the national supply rate of affordable housing created through the market filtering of existing housing stock to lower-income households stopped and actually went negative, indicating that higher-income households are renting lower quality stock (Myers and Park, 2020).

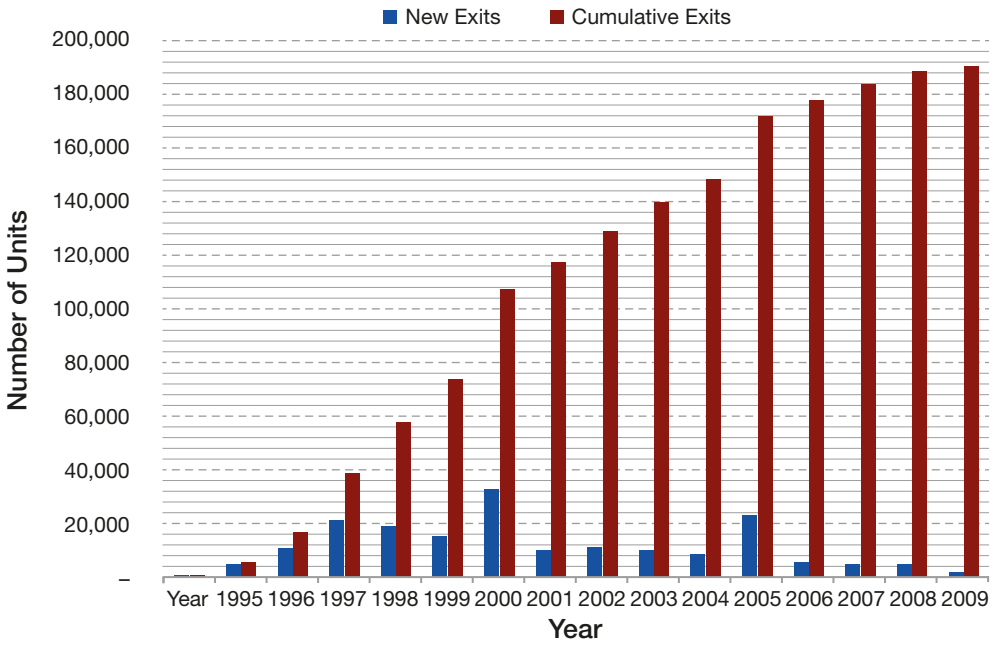
In addition to the financial barriers that make constructing new affordable housing exceedingly difficult, many existing, federally-subsidized affordable housing units are reverting to market-rate rents due to expiring affordability covenants (Joint Center for Housing Studies of Harvard University, 1999). The project-based Section 8 subsidies that were given to property owners in the 1980s and 1990s only ensured the affordability of units for 5–30 years. For example, Los Angeles' Housing and Community Investment Department (HCIDLA) has identified approximately 11,200

[1] The CLT's legal name is Tenemos que Reclamar y Unidos Salvar La Tierra-South LA.

affordable housing units across 394 properties whose affordability covenants were set to expire or rental subsidies terminate between 2018 and 2022 (HCIDLA, 2018).

Exhibit 1

Number of Units Exiting the Project-Based Section 8 Program, by Year



Source: Adapted from Vincent Reina and Ben Winter in Schwartz et al., 2016.

Recognizing the looming disaster, the MacArthur Foundation developed an ambitious, 20-year Window of Opportunity program in 2000, aiming to preserve the affordability of 300,000 existing affordable rental housing units by 2020. The hope was that by focusing this demonstration project on federally-subsidized projects, they would be able to identify public policies that could help maintain affordability more broadly. Unfortunately, despite a major investment in policy advocacy by the Foundation over several years, a 2014 evaluation report on the Window of Opportunity program found that the Foundation was unable to change federal laws, funding, and regulations enough to increase the preservation of existing federally-subsidized affordable housing (Schwartz et al., 2016).

Although the affordable housing literature perennially finds that any one solution or strategy lacks national "scale" solutions, it may be misguided to classify them as failures, given our politically decentralized country (Howell, Mueller, and Wilson, 2019). In other words, addressing the shortage must involve varied and piecemeal strategies designed and implemented by localities, nonprofits, and philanthropies. Indeed, the MacArthur Foundation's evaluation study suggests that a common theme of the ongoing work to preserve existing affordable housing is that successful efforts require a network of organizations working together to overcome structural barriers. Although the 2016 study emphasized the importance of reputable leaders with technical

experience in successful networks, other research has indicated that "radical collaboration"—including grassroots leadership development—is also key to preserving affordable housing (Howell and Wilson, 2019).

In hindsight, it is clear that designing affordable housing strategies requires a more sustainable approach than extending current subsidies for some years, only to face the same dilemma later. We need other models. One promising strategy for maintaining the affordability of privately owned housing is shared equity affordable housing schemes (Davis, 2006; Theodos et al., 2017), a category that includes CLTs. Although the designs of shared equity schemes vary, their essential components are the same: households may own or rent the housing unit, but the land is held in a "community land trust" and/or the deed has restrictions on resale (e.g., a ceiling on resale price is imposed). Such mechanisms help prolong the affordability of CLTs indefinitely by mitigating the capitalization and subsequent resale concerns associated with private land markets. And in the case of rental units, the presence of stewardship organizations that contain resident and/or community representation also helps prevent rent increases that undermine affordability (Abromowitz and White, 2010; Libby, 2010).

In sum, shared equity schemes like CLTs have the potential to maintain affordability far longer than the 15–40 year requirements of Low Income Housing Tax Credit (LIHTC) or Section 8-funded developments, (Pub. L. 101-239 and Pub. L. 93-383). In such cases, private developers typically own the underlying land and enlist a private property management company. After affordability covenants expire, developers have free license to raise rents or sell the property to extract profits from its capitalization, which many do, as exhibit 1 shows.

In addition to affordability, studies have found that CLTs and other shared equity housing schemes bestow a variety of other benefits on their communities, including lower rates of foreclosure and eviction, wealth creation, neighborhood stabilization, and greater racial equity of ownership (Choi, Van Zandt, and Matarrita-Cascante, 2018; Temkin, Theodos, and Price, 2010; Wang et al., 2019). Yet despite those benefits, the number of CLTs has plateaued, and CLT housing remains a minor part of the country's overall housing stock (Thaden, 2018). The distribution of CLTs and other shared equity housing developments is also quite uneven across the United States. For example, as of 2018, of the 2,997 active CLT properties sampled by Wang et al. (2019), none were present in major metropolitan regions such as New York, Los Angeles, Dallas, Houston, Philadelphia, Atlanta, or Washington, D.C.

Several factors help explain this bottleneck in the production of CLT affordable housing. For one, federal regulatory reform is needed to allow mortgage financing on CLT properties. Moreover, CLTs have historically been financially feasible in only niche situations, where developable and relatively affordable land sites are still available, but the private affordable housing industry is underdeveloped. Low site acquisition costs explain why the largest and most famous cases of CLTs have been in rural or depressed urban areas. Yet this concentration of CLTs in rural and inexpensive land markets calls into question their viability as a substantial generator of affordable housing in the urban areas of the United States. Sharply increasing land values are a core problem of the country's affordable housing shortage, especially within its cities.

Another limitation is that CLTs have tended to focus on new construction and homeownership instead of rental properties. Beyond the debatable inefficiencies of subsidized homeownership, the fact is that one-third of the nation rents, and in a large city like Los Angeles, roughly 64 percent of households rent rather than own (HCIDLA, 2018). If shared equity housing is to be a significant component of the affordable housing solution, the strategy must include rental housing. Furthermore, in built-out cities with only infill opportunities, redevelopment rather than new construction is a necessary approach, particularly in better locations with access to opportunities (Lens and Reina, 2016). Especially in the case of expiring affordability covenants, redevelopment offers the potential to keep people in place as popular resistance to gentrification and displacement grows nationally (Choi, Van Zandt, and Mararrita-Cascante, 2018; Zuk et al., 2018).

Expanding the potential of CLTs and other shared equity housing models to create sustainably affordable rental units via redevelopment requires exploring some thorny issues not yet well addressed in the shared equity housing literature. One of the largest hurdles is how best to buy out private owners who currently have the option to sell on the open market. Another is how best to engage current residents, rehouse them during construction, and ensure their right of return.

These two types of activities point to the two disparate types of expertise that will be required: financial management and community engagement. These activities are often viewed as a tradeoff between professional scaling to reach more but less needy households versus grassroots, tenant organizing that can tailor small projects to specific needs (Bratt, 2016; Gray and Galande, 2011). But as the literature on the preservation of affordable housing has found, it seems feasible that organizations with different types of expertise could partner in synergistic ways (Schwartz et al., 2016).

To help fill this literature gap, this study examines a rare case of collaboration between CLT housing activists and a professional affordable housing developer. Their partnership resulted in the redevelopment of a rental property with expiring affordability covenants into a higher-quality housing complex that contains nearly triple the number of units and will remain affordable indefinitely. Organized chronologically by the major hurdles crossed during the development process, this case study analysis allows examination of an array of financial, political, and organizational hurdles overcome by the two partners, as well as new challenges that come with collaboration. The study then assesses the case from a system-wide view in order to find lessons for increasing the supply of sustainably affordable rental housing in American cities.

The Context: Affordable Housing Development in Los Angeles

Over the past several decades, the Los Angeles region has experienced a growing housing crisis as its economy and population have grown without a commensurate expansion in housing supply (Myers, 2019). A few interrelated dynamics have produced this situation. Contrary to the conventional wisdom of decades ago, southern California's housing density is now relatively high, although as a polycentric urban region, its density unfolds in a distinct pattern relative to monocentric ones (O'Flaherty, Osgood, and Regus, 2014; U.S. Census Bureau, 2012) The Los Angeles region's housing density is smoother than many other American metropolitan areas: although its urban core is not as dense as New York City's, its "suburban" communities are

much denser than their East Coast counterparts. This situation means that nearly all housing development in the Los Angeles region must occur via in-fill and redevelopment (Eidlin, 2010).

Despite this density and the high demand for housing in the Los Angeles region, the area suffers from some of the most restrictive planning and land-use zoning regulations in the county (Broughel and Hamilton, 2019). California's costly environmental review process (BIALAV, n.d.), in combination with the typical "not-in-my-backyard" ("NIMBYism") obstacles, has significantly inflated the cost of developing housing in Los Angeles (Gyourko and Molloy, 2015). These challenges are especially problematic for affordable housing projects, which often require greater density and height so that lower projected revenues are offset by reduced fixed costs per unit. Because of this financial calculus, the City of Los Angeles passed the Transit-Oriented Communities (TOC) Ordinance (Los Angeles Municipal Code § 12.22 A.31) in 2017, after the RCG's redevelopment took place. The Ordinance now allows taller and denser structures near transit stations in exchange for the inclusion of affordable housing in new developments.

Regardless, the development costs for affordable housing in Los Angeles are high. For example, the per-unit median total development cost of recent publicly funded Measure HHH affordable housing in the core of the Los Angeles metropolitan area is $558,110.[2] Perhaps unsurprisingly, Los Angeles' per-unit development costs exceed the state average of $425,000 in 2016 (Terner Center, 2020). That figure is also higher than the national LIHTC-funded per-unit development costs of $191,902 in 2018 (Lubell and Wolff, 2018).

More importantly, the affordability covenants for these new units in Los Angeles are set to expire after 55 years (City of Los Angeles, 2017). Given how extremely difficult and costly it is to create affordable housing in Los Angeles, and given the great deal of public subsidies used, it is untenable to plan to give up these units. Expiration dates were broadly instituted in the 1980s, an era of devolution and the dismantling of federal public housing, in order to entice the participation of the private sector in the provision of private, affordable housing. Some assumed that with the initial public help, the market would continue to provide affordable housing without subsidies. In places like Los Angeles, however, where populations have increased and real estate prices have outgrown incomes, this practice forestalls and exacerbates the affordability problem by allowing these units to charge market rates in the face of even larger housing shortages later. As a result, we need new strategies for sustaining the affordability of affordable housing. Community land trusts are one such strategy.

The Formation of a New Rolland Curtis Gardens

History of the Project Site, 1981–2012

The original RCG complex at 1077 W 38th Street in south Los Angeles was developed in 1981 as 48 units of affordable housing in six two-story buildings oriented around a garden courtyard. With

[2] Measure HHH, approved by City of Los Angeles voters in November 2016, is a bond-financing mechanism for the construction of affordable housing for homeless individuals or those at risk of becoming homeless. Data on its subsequent implementation, including funded projects, is available at: https://lacontroller.org/audits-and-reports/hhhactionplan/. Our calculations isolated 87 projects south of the San Fernando Valley and north of the City's southernmost Council District 15.

funding from the U.S. Department of Housing and Urban Development (HUD), an affordability covenant was placed on the property by the Los Angeles Community Redevelopment Agency (CRA/LA), ensuring that the complex's units would remain affordable until January 27, 2011, even as RCG changed ownership two times before then (CRA/LA, 2006). Community advocates such as TRUST, along with the City of Los Angeles, have been concerned about LA's many properties with expiring affordability covenants (LADCP, 2013). By 2010, TRUST had identified four properties whose affordability covenants were expiring in the neighborhood and began advocating for tenants. One of those four properties was the original RCG complex.

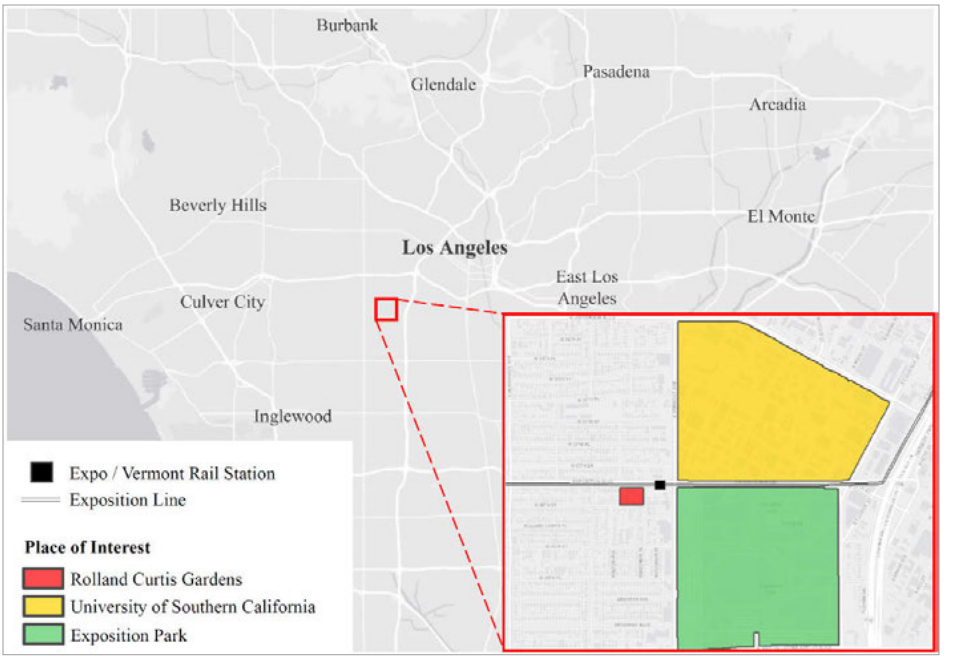
In 2011, just as RCG's CRA/LA-imposed affordability covenant was expiring, RCG's private owner announced his intent to convert the complex to market-rate housing. This decision was predictable in light of two factors: (1) LA Metro's upcoming extension of the light rail Expo line, which would result in a Metro stop directly in front of the property, increasing its transportation accessibility and therefore its market value; and (2) the property's amenity-rich location near Exposition Park and the University of Southern California. In contrast to the RCG, the owners of the three adjacent properties previously identified by TRUST voluntarily opted back into the Section 8 housing program, perhaps incentivized by the array of renewal options HUD has introduced during the past few decades.[3] Accordingly, TRUST focused its efforts on maintaining the affordability of units in the RCG complex.

In February 2011, tenants of the complex began receiving 60-day eviction notices from the property's management company. With support from the Legal Aid Foundation of Los Angeles (LAFLA), TRUST worked with the tenants to fight eviction, forcing the private owner to follow the necessary notification procedures associated with converting affordable housing units to market-rate. As a result, their eviction notices were revised from 60 days to the legally required 90 days. In addition, TRUST and LAFLA ensured that 11 of the building's original tenants would continue receiving "enhanced" vouchers, which would allow them to continue to be tenants for the remainder of the development's use as a rental property. Despite this concerted advocacy work, by mid-2012 the property management company stopped maintaining the building, and at least 24 of the complex's 48 units became vacant (Fulton, 2012).

[3] Renewals of project-based Section 8 agreements vary significantly across developments, both in terms of renewal period and unit pricing. For the full spectrum of renewal options available to owners of project-based Section 8-funded developments, please see HUD's updated guidance at: https://www.hudexchange.info/resource/4851/section-8-renewal-policy-guidebook/.

Exhibit 2

Rolland Curtis Gardens' Location in the Los Angeles Region and Relative to Neighborhood Amenities



Sources: Created with Los Angeles County Office of the Assessor and Los Angeles City Planning GIS shapefiles

Joining Resources to Acquire the RCG, 2012

TRUST's community organizing had achieved short-term protections for residents of the original RCG complex. Nevertheless, they realized that the site would ultimately require redevelopment with new affordable housing units because the existing structures on the parcel were nearing the end of their useful life. Property redevelopment, however, required a distinct set of skills that TRUST did not possess. As a result, they contacted one of their founding partners, Abode Communities, who had extensive experience in acquiring funding for and developing large-scale affordable housing development projects. Because Abode Communities had never officially partnered with a CLT before, this collaboration was a unique project development process for both parties.

Abode Communities and TRUST had originally attempted to purchase the RCG site from the private owner in 2010, anticipating the upcoming expiration of the CRA/LA-imposed affordability covenant. According to TRUST, the private owner was initially unwilling to sell the property. On the residents' behalf, TRUST not only fought the improper eviction notices they had received but also documented numerous property maintenance issues. This work produced substantial negative media coverage, and eventually, the Los Angeles Housing Department (now known as HCIDLA) ordered more than 300 improvements to the derelict property. Presumably, the mandated costs, as well as the enhanced vouchers that families would retain even after market-rate conversion, altered the owner's calculus. About 2 years later, on July 27, 2012, Abode Communities and TRUST were finally able to co-acquire the site for $10.05 million.

Financing the RCG site purchase was difficult for Abode Communities and TRUST for several reasons. Los Angeles' rapidly appreciating, expensive real estate market meant land values were rising quickly through the preacquisition phase. The negotiated price of $10.05 million exceeded the property appraisal value of $8.4 million because the private owner insisted on receiving compensation for a prepayment penalty on the loan he used to originally purchase the property. Furthermore, the property appraisal's comparable sales price, developed from nearby property sales, did not account for the incoming Expo line station. In fact, Abode Communities estimates that the property's value had appreciated to $11 million by the time of redevelopment.

Both the private and public funding sources available for affordable housing development did not allow a site's purchase price to exceed its appraisal value. As a result, TRUST and Abode Communities had to creatively assemble private sources of funding to acquire the site. Together, the two groups raised $1.8 million in private foundation grants, and Abode Communities contributed $1.5 million in Capital Magnet Funds they had received from the U.S. Treasury. Later, TRUST and Abode Communities received an additional $1 million private loan from the California Community Foundation. Finally, on top of this equity, Abode Communities successfully negotiated a boutique loan with Wells Fargo Bank; the loan terms included a low interest rate and an extended, 5-year repayment period. Undoubtedly, Abode Communities' acumen and reputation helped secure this critical financing with advantageous terms. Exhibit 3 summarizes these acquisition funding sources and amounts.

Exhibit 3

Site Acquisition Funding Sources

Funding Source	Amount ($)
TRUST and Abode Communities Equity	1,800,000
Abode Acquisition Loan	1,000,000
Abode Unsecured Loan	500,000
CCF Community Foundation Land Trust ("CFLT") Loan	1,000,000
Specialized Wells Fargo Permanent Mortgage	5,757,000
Total	**$10,050,000**

Source: Abode Communities.

With all their success in raising private funding, however, this affordable housing project managed by nonprofits initially lacked any public funding investments for the acquisition, and the property had no deed restrictions. In turn, the Los Angeles County Assessor's Office initially determined that the project was ineligible for a "welfare exemption" from property tax payments during the redevelopment period, which increased its overall cost. Abode Communities and TRUST therefore worked with HCIDLA to design a unique small public loan for the project, which placed new affordability covenants on the property and therefore made the redevelopment project eligible for the property tax exemption. After this project, TRUST and other members of the California CLT Network have lobbied state legislators to exempt CLTs from paying property taxes on affordable housing projects, resulting in California State Bill 1056 in 2018.

Redevelopment of Rolland Curtis Gardens

Site acquisition was costly because RCG has a valuable location with a light rail stop and bus stops, and proximity to commercial and cultural resources (see exhibit 2). Finding ways for affordable housing to exist in places with transportation access to employment is an important public policy issue. Typically, affordable private housing options are pushed farther and farther out of the urban region, with households paying more in commuting time costs and decreased opportunities and amenities (Lens and Reina, 2016). This displacement can negatively impact not only individual households' economic opportunities but dismantle an entire community's place of belonging (Crisman and Kim, 2019), like those of the intergenerational families that have called RCG home for decades.

Ironically, public and private investments in amenities can exacerbate the displacement of affordable housing (Zuk et al., 2018). Many studies have documented how transportation investments are capitalized into nearby real estate (Boarnet et al., 2017; Bowes and Ihlanfeldt, 2001; Goetz et al., 2010; Hess and Almeida, 2007). This situation leads to a compounded negative impact for lower-income residents, who are often more dependent on public transit; they become displaced by rising rents and isolated from employment and other opportunities. As a result, states and municipalities have recently made efforts to give preferential treatment for affordable housing projects in transit-oriented developments (Los Angeles City Planning, 2020; SCAG, 2020).

Designing for Affordability and Community, 2013–14

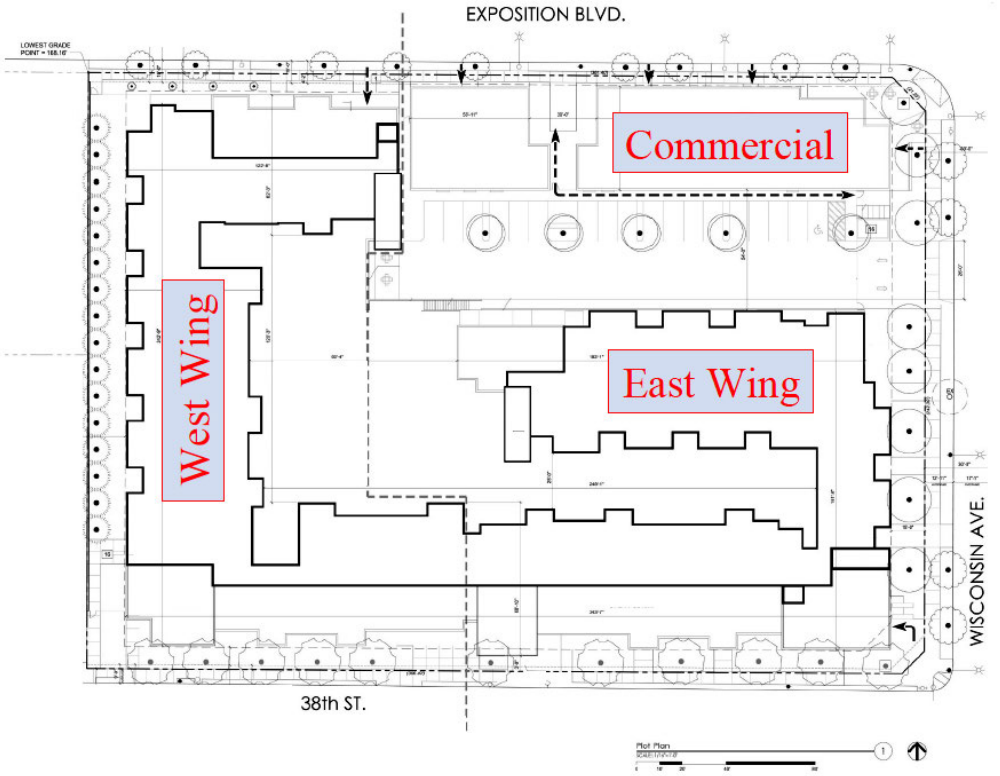
Abode Communities and TRUST both agreed that the redeveloped RCG would need to contain more units than the original building in order to be financially feasible and to maximize the affordable housing offered by this advantageous site. Redevelopment projects with increased density, however—and affordable housing projects in general—perennially face opposition from both residents and neighbors.

TRUST took the lead in engaging existing RCG residents, residents of the surrounding neighborhood, and members of local community-based and faith-based organizations in a participatory urban design and planning process during a 4-month period. Several factors contributed to meaningful participation. Neither TRUST nor Abode Communities had a predetermined design for the site. Instead, TRUST started with their tenant-organizing relationships, which included doing an asset-mapping project, so that the members started with knowledge about the site in relation to the neighborhood. TRUST's organizational structure includes a board in which most of the seats are occupied by elected grassroots members, with bilingual meetings in English and Spanish to promote participation.

The five community design sessions were jointly designed and facilitated by a team of TRUST organizers and Abode Communities' staff planners and architects. Residents originally wanted more car parking and less density, but after engaging in financial analysis exercises that clarified the tradeoffs, the community proposed a relatively dense design. Their plan increased the number of units from 48 to 140, and it incorporated an underground parking garage with reduced parking ratios. The residents also significantly shaped the design to locate commercial uses on the street front, separated from the two residential wings behind it (exhibit 4). Their participatory process was so successful that the California Community Foundation supported the creation of a "Guide to Transit-Oriented Development" informed by this work (Pasciuto et al., 2013).

Exhibit 4

Rolland Curtis Gardens Site Plan



Source: T.R.U.S.T. South LA.

The design's higher density required additional city environmental reviews and approval, however, which extended the project's financing costs another year. In 2014, Abode Communities filed entitlement requests[4] under a Mitigated Negative Declaration (Case No. ENV-2013-3341-MND), and they were ultimately approved after a public comment period.[5] Of particular note was a request seen as a daring appeal at the time: an exemption from the municipal parking code to a reduced parking ratio of 0.8 parking spaces per housing unit, justified by the site's location directly in front of a light rail stop. Beyond this project, TRUST played an active role in the community-labor coalition that developed an ordinance initiative petition for a change in policy. Now, Los Angeles' aforementioned TOC Ordinance, implemented in 2017, reduces parking allotments to 0.5 by right, expediting the costly entitlement process.[6] RCG's reduction in parking spaces was important for the project's financial feasibility.

[4] Essentially, these are requests for approval from the City's Planning Department to implement a proposed land use (e.g., construct a building based on its proposed design) without limitation.

[5] To view the MND's Initial Study, please see: http://clkrep.lacity.org/onlinedocs/2014/14-1548_misc_e_11-3-14.pdf.

[6] See Los Angeles' TOC Affordable Housing Incentive (Los Angeles Municipal Code § 12.22 A.31, https://planning.lacity.org/ordinances/docs/toc/TOCGuidelines.pdf).

Another advantage of the larger RCG design was that it allowed Abode Communities and TRUST to divide the project components and thereby maximize public funding streams. The 140 housing units span two separate "phases" established as distinct legal entities—the East and West wings—each of which was able to receive a LIHTC investment. In a similar way, Abode Communities defined a separate Commercial portion of the plan to allow the receipt of New Markets Tax Credit equity. Exhibits 5 – 7 list the funding sources for the RCG CLT's construction and permanent loans.

Exhibit 5

East and West Wing Construction Funding

Funding Source	East Amount ($)	West Amount ($)
Construction Loan	26,238,329	23,500,000
California Housing and Community Development ("HCD") Infill Infrastructure Grant ("IIG")	2,280,000	–
HCD Affordable Housing and Sustainable Communities ("AHSC") – Housing Related Infrastructure ("HRI")	801,830	1,208,750
HCD AHSC Program	445,000	44,820
HCD AHSC – Sustainable Transportation Infrastructure ("STI")	–	503,000
Los Angeles Housing + Community Investment Department ("HCIDLA") Affordable Housing Trust Fund ("AHTF")	–	4,900,000
Deferred Interest	–	258,000
Deferred Costs	895,500	2,211,347
Deferred Developer Fee	600,000	760,620
GP Low Income Housing Tax Credits (LIHTC)	100	100
LP Low Income Housing Tax Credits (LIHTC)	2,525,558	1,768,965
Total	**$33,786,317**	**$35,155,602**

Source: Abode Communities.

Exhibit 6

East and West Wing Permanent Funding

Funding Source	East Amount ($)	West Amount ($)
Permanent Loan	3,650,633	2,756,800
HCD AHSC	2,753,169	3,911,504
HCD IIG	2,280,000	–
HCD AHSC – HRI	801,830	1,208,750
HCD AHSC Program	445,000	44,820
HCD AHSC –STI	–	503,000
HCD Multifamily Housing Programs ("MHP")	–	5,773,538
HCIDLA AHTF	–	4,900,000
Deferred Interest	–	258,000
Deferred Developer Fee	600,000	760,620
GP LIHTC	100	1,348,933
LP LIHTC	23,255,585	13,689,637
Total	**$33,786,317**	**$35,155,602**

Source: Abode Communities.

Exhibit 7

Commercial Construction and Permanent Funding

Funding Source	Commercial Amount ($)
New Markets Tax Credit Fund Loan A	4,294,550
New Markets Tax Credit Fund Loan B	1,945,450
Sub-Ground Lease Contribution	350,995
Total	**$6,590,995**

Source: Abode Communities.

Advocating Community Support for Affordable Housing

Gaining public support for the project required considerable outreach to the neighborhood surrounding the project site. Early on in the development phase, TRUST began conducting grassroots, door-to-door conversations with local residents to promote awareness of the CLT and to encourage participation in the redevelopment planning processes.

A variety of opponents to the project appeared as well, including paid consultants warning of the project's negative impact on environmental health, commercial competition, and poverty. In addition, a petition against the project started to circulate, targeting Latinx homeowners and an African-American neighborhood toward the west, which gained nearly 200 signatures.

In responding to these concerns, TRUST was conscious of managing the racial dynamics in the area. About 90 percent of the original RCG residents were African-American, African, or Afro-Caribbean, whereas around 78 percent of the residents in the immediate neighborhood were Latinx.[7] In order to counter apprehension and misinformation, TRUST organized RCG tenants and TRUST volunteers to canvas the neighborhood in mixed pairs, one African-American and the other Latinx, with both English and Spanish-speaking capacity, to personally explain the project. Overall, during this development period, TRUST outreach teams worked with existing RCG tenants to knock on 550 doors in the surrounding neighborhood and to contact local community and faith organizations. At the final public hearing on the RCG redevelopment project, active resident and community leadership spurred the attendance of 200 supporters in matching green t-shirts, far outnumbering the few opponents present. That the proposed redevelopment project passed environmental review in less than 1 year is a testament to the effectiveness of TRUST's community engagement. Equally important, their work may have helped establish community-based support for future affordable housing projects in the area.

Resident Relocation and Temporary Housing During Construction, 2016-2017

United in their goal to mitigate displacement, TRUST, Abode Communities, and the existing residents established a formal right-to-return policy via a collaborative process.[8] Before construction could commence, the original complex's remaining 24 households needed to vacate the site. By law,

[7] Per Table B03003 of the 2012 5-year ACS, for census tract 2312.20.

[8] This policy was a critical undertaking because Los Angeles residents currently have no codified rights of return, but they have rights to replacement units. Los Angeles' Rent Stabilization Ordinance grants replacement rentals for properties built on or before October 1, 1978 (LAMC Section 151.28).

TRUST and Abode Communities reserved funds to pay tenants' moving expenses, cover security deposits, and include professional relocation services. Despite a relocation consultant's assistance, it was difficult for most of the residents to find places nearby that would accept their Section 8 vouchers. In fact, this situation is such a common problem that, in 2019, the California legislature passed SB-329, which outlaws blanket discrimination against voucher holders, prohibiting "No Section 8" language in advertisements.

TRUST board member John London relates that although tenants and TRUST members now speak as family and wax nostalgically about the redevelopment of RCG, there was a tough period of trust-building. With demolition approaching and residents yet to find alternative housing, he recalls yelling and bottles being thrown at meetings. Some of the residents turned to the University of Southern California's Housing Law Clinic lawyers to negotiate a new agreement with Abode Communities and TRUST. Originally, residents had been offered the legally mandated amount in move-out expenses, starting at $1,375 per apartment, with more budget reserved for potential rent differentials. Later, Abode Communities and TRUST offered an additional $7,000 to tenants once they signed leases at new apartments (Mackovich, 2017; Poston and Smith, 2016), which was well above what was legally required.

With 90 days left before demolition, TRUST took matters into their own hands. They rented vans and drivers and formed teams with tenants that would set out at 6:00 a.m. on mapped routes, searching block-by-block for any available housing. They tailored the search to residents' specific needs, such as accessibility for those with disabilities and proximity to schools and jobs. Most of the original RCG residents were African-American, and they faced significant discrimination in searching for new housing in the market. London recalls complicated layers to this discrimination, in which landlords on the phone would say there was no vacancy if TRUST's team member with a Haitian accent inquired, but then would have availability if someone with an American accent inquired in person at the rental office. In addition to the group search teams, TRUST and Abode Communities leveraged their networks with other housing nonprofits to find units for the remaining original residents. In the end, Abode's and other nonprofits' existing affordable housing projects were instrumental in providing the relocation housing for the remaining RCG residents that the private market would not. Everyone was eventually resettled by the 2017 deadline. The state delayed their funding agreements for the project, however, so actual construction did not start until 2018.

The New RCG Starts Leasing: 2018–19

TRUST stayed in contact with the relocated families throughout the construction period, and they reconnected with each household to offer units when the new complex was ready to start leasing. Of the 48 households who lived in the original RCG complex, 25 ultimately decided to return to the new RCG CLT. Those who did not return preferred to stay in the relocation housing they had found, or their family situations or needs had changed.

Having received nearly 3,000 rental applications for the completed 140 units, Abode Communities hosted a public lottery to lease the new Rolland Curtis Gardens in 2018. People lined up around the block to attend the leasing meeting (exhibit 8), and frantic inquiries were

posted on social media, underscoring the deep need for affordable housing in Los Angeles. The design of the RCG came out beautifully, with water-conservation landscaping, open and passive cooling hallways, and community recreation areas that create a high-value living environment in stark contrast to the old RCG.

The new RCG also more than tripled the amount of affordable housing supplied by the property. Its 140 units currently house about 600 residents. A small, locally owned produce market and St. John's Well Child and Family Center, which is expected to serve 10,000 health clinic patients annually, moved into its commercial row. The complex also offers the same affordability for the tenants who returned. RCG's remaining units are available to households earning a range between 30 percent and 60 percent of area median income (AMI). The agreement between TRUST and Abode Communities was that at least 36 units would be rented to households with AMI as low as 30 percent. The RCG case has been featured in a public television documentary as a promising model for countering gentrification and displacement (Baghdadi and Hammerling, 2017).[9]

Exhibit 8

Lines Form to Attend the New RCG Leasing Meeting, July 12, 2018

Source: LA City Council Member of RCG's District 8, Marqueece Williams; https://www.instagram.com/p/BlJ5AlCh4nX/

[9] The RCG site is featured at timestamp 7:26 in this video: https://www.kcet.org/shows/city-rising/clip/gentrification-and-displacement-the-future.

Partnership: CLTs and Affordable Housing Developers

This case study has detailed how a community-based land trust and a nonprofit affordable housing developer were able to collaborate and build sustainably affordable rental housing in a gentrifying neighborhood. The sustainability of affordability is the defining characteristic of this project, distinguishing the CLT approach from more mainstream affordable housing projects that are still currently being built in the Los Angeles region via Measure HHH. Achieving this sustainability in the redevelopment of central city affordable housing that did not displace residents involved three key aspects: (1) right of return, (2) resident leadership, and (3) neighborhood outreach.

Because avoiding displacement is core to the goal of affordability sustainability, this case highlights the need for resident relocation during construction and "right of return" procedures. Residents had trouble finding private housing in the vicinity that would accept Section 8 vouchers during the construction period, which is exactly why this project was needed. Instead, TRUST's and Abode Communities' network of relationships with other nonprofits, as well as Abode Communities' extensive portfolio of other affordable housing projects, ultimately helped secure the last of the relocation housing units. Meanwhile, TRUST's intimate relationship with residents before, during, and after project development—and the extraordinary effort they made to find temporary housing—is work that CLTs are uniquely positioned to fulfill. In interviews, TRUST staff could name every original resident, their current residences even if they chose not to return to the RCG, and what was occurring in their life situations.

Furthermore, as the literature has found, local leadership development is key to ensuring the sustainability of CLTs. The partnership between Abode Communities and TRUST and their aligned value of community engagement produced an exemplary participatory design process and outcome, both of which helped residents gain a sense of ownership and buy-in to the project. Abode Communities architecture staff found the RCG project particularly rewarding because TRUST had been able to facilitate a productive process, one that educated residents about regulatory and fiscal constraints and enabled them to propose creative solutions that better met their needs and increased support for the project. Residents and community members are TRUST's board members.

TRUST's leadership in tenant organizing and neighborhood asset mapping, the relationships and knowledge they had built through their advocacy work, and their savvy in managing community racial and power dynamics in meetings were all invaluable to the project. Without the intense and continuous community outreach work of TRUST, the new RCG complex would not have been designed for community needs and would most likely have stalled in the environmental review process due to opposition from some neighbors. At the same time, without Abode Communities' financial expertise and the management of the entitlement and development processes, the project would not have been financially feasible, especially given all the delays.

As new partners, however, the two organizations had to learn how to communicate and forge mutually beneficial arrangements. For example, much of the key community organizing contributions described previously are typically uncompensated. The CLT literature, with few exceptions (Lowe and Thaden, 2016), also tends to focus on the legal and financial aspects of

the CLT model. Sandra McNeill, TRUST executive director from 2007–17, reflects that TRUST had to learn how to better define the value that the organization brings to projects and how that translates into their own project fees to their development partners. Abode Communities and TRUST engaged a third party to audit the project budget and help identify TRUST's compensation in contracting fees and ground-lease fees for stewarding the property and maintaining resident organizing during the prolonged development phase.

Meanwhile, like many affordable housing developers (Schwartz et al., 2016), Abode Communities' model is to recoup their own compensation through developer fees, which in this case paid for 8+ years of staff time as well as their risk exposure in providing financial guarantees throughout the life of the project. Holly Benson, Abode Communities Executive Vice President and Chief Operating Officer, recalls that this venture was a unique project for them in working with a CLT. She appreciates that a strength of the collaboration was TRUST doing "[a much] deeper dive with the community instead of just leaving notices." She observed that as the project progressed, TRUST had to shift in its identity, moving from a tenant activist entity to a property developer, owner, and landlord.

Looking Forward

Although the RCG case itself was a success, it also raises questions about its replicability and potential. The case elucidates some policy changes that would facilitate future projects, but it also highlights some of the intractable problems associated with developing affordable housing in American cities.

For one, this case indicates that CLT organizations cannot achieve projects like the RCG by themselves. A partnership and synthesis of skills between a CLT and an expert housing developer are likely necessary to achieve success in complex and costly housing markets. The ultimate benefit of the CLT model—sustainable affordability for residents—does not incentivize developer participation. Neither does having to engage with a partner organization or ceding revenue to them. The community engagement and activism facilitated by CLTs are valuable in securing project approval and affordability sustainability, but that will be insufficient to gain the partnership of many private, albeit nonprofit, developers. Rather, RCG's unusually prime location is what initially brought Abode Communities and TRUST to work together. The location's strong and appreciating land values help ensure occupancy and the long-term financial viability of the project. Ironically, then, the problem of a rapidly appreciating real estate market and prime locations could be the most conducive context for such collaborations between a CLT and an affordable housing developer.

Still, both nonprofits were able to raise a large amount of equity for this project, and this fundraising does not appear easy to replicate. Los Angeles has an especially rich ecology of foundations, nonprofit organizations, and affordable housing corporations. Therefore, this case still confirms the CLT literature's point that with private land sites, CLTs only work in specific niche situations of relatively feasible site acquisition costs, strong housing demand, and the supply of other affordable housing developers.

The development of the new RCG CLT was not cheaper than more mainstream affordable housing projects in Los Angeles. Its implied per-unit total development cost of $564,227 (i.e., $10.05 million in acquisition costs and $68.94 million in development costs spread across 140 units) is close to the per-unit median total development cost of $558,110 in the core of Los Angeles. Rather, what separates the CLT model from other affordable housing solutions is its sustainability, a vital aspect considering the climbing costs of housing relative to income throughout the country. Therefore, changing the calculus so that CLTs are not only utilized in "niche" situations but can be more broadly instituted is a worthy pursuit.

Cities and states have the power to mitigate many of the hurdles and costs traced in this case and thereby encourage greater participation by developers like Abode. First, policymakers could adjust the appraisal methodology for properties in rapidly appreciating real estate markets, especially where their own transit investments are spurring this appreciation. Adjusting property valuations to include recent and anticipated neighborhood changes, such as a new transit stop, would help move more appropriate levels of public funds to affordable housing projects in gentrifying areas.

Second, Abode Communities and TRUST had to expend large amounts of their own equity to build a project that can preserve affordable units in perpetuity, which is producing a substantial public benefit. Public authorities could help reduce these costs by exempting nonprofits such as CLTs from paying property taxes like other nonprofits when developing affordable housing. For example, although the RCG project needed to take out a unique HCIDLA-designed loan to avoid paying property taxes during predevelopment, California eventually addressed this issue in 2018 as a result of lobbying from a network of state CLTs. Senate Bill 1056 exempts CLTs from paying property tax from the point of site acquisition until project completion.

Third, this project spent about 3 years in the entitlement process, with Abode Communities and TRUST obtaining variances and expending considerable labor assuaging neighborhood opponents who made spurious claims. To accelerate the development timeline, cities could increase allowable density, floor area ratio, and building heights of CLT and other affordable housing projects in their environmental review requirements. Given California's housing crisis, some cities and the state have been enacting bolder pro-housing legislation. For example, Los Angeles' TOC Ordinance of 2017 now allows a number of affordable housing projects to be developed by-right, with higher densities and reduced parking for projects near transit.

Allowing by-right development has also assisted such projects' developers in meeting the "shovel-ready" requirement often attached to public housing funds. Given the local specificity of the TOC Ordinance, such a policy may not be feasible for other municipalities. Similar policies that relax the entitlement process for affordable housing projects, however, like the recent Senate Bill 827 proposed by the California State Legislature or New York City's inclusionary zoning and density bonus program, can provide similar incentives.

One should note that although California voters approved bond measures that exhibited general support for responding to the affordable housing and homelessness crisis, there have also been a number of recent anti-density referenda in the Los Angeles region seeking to suspend real estate development other than single-family by-right construction—namely Measure S for the City of

Los Angeles and Measure LV in the City of Santa Monica. Proponents of such anti-construction measures have included both the usual NIMBY, anti-density activists but also lower-income community groups seeking to stop gentrification and displacement. TRUST and Abode worked to oppose these proposals, both of which would prohibit the development of affordable housing projects. Public awareness of the relationship between density and affordable housing is starting to form with more recent measures, such as California Assembly Bill 68, which allows accessory dwelling units to be built by right. More public education, however, is needed.

In answering the initial question of how a CLT can develop affordable housing in an expensive real estate market, one answer is that it takes a lot of money. From a larger system point of view, federal, state, and local rules make it extremely expensive to build affordable housing. McNeill asks why there is not a better way than spending $70 million and a decade to build 140 units. Although some ways to decrease the costs of affordable housing development through reductions in property taxes and expediting approvals were mentioned previously in this article, another important way to encourage more CLT projects is to find a way to lower the high costs of site acquisition.

Buying space for affordable housing in the private real estate market is a core challenge. As seen in this case, the market system is predicated on property owners' entitlement to reap appreciating values, including from public rail transit investment and proximity to other amenities. Timing is key, especially for affordable housing developers. The RCG project could have been less costly had TRUST and Abode Communities been able to acquire the site earlier, in addition to shortening the entitlement and development period. The Exposition Park neighborhood was still at early-stage gentrification in 2012 and still relatively less expensive than other parts of Los Angeles. Today, this project would not have been possible.

At its core, this case details how extremely difficult it is to redevelop affordable housing in expensive urban areas given the development costs, the neighborhood opposition, and the shortage of temporary relocation housing. This difficulty also makes it clear that this tremendous effort and its hard-fought successful outcome should not be "given away" in the future. The CLT design and local leadership are key to ensuring the preservation of affordability.

A large-scale implication is that a shift in public policy is needed that stops directing public funds for affordable housing projects with affordability expiration dates. Furthermore, a federally-funded grant program for CLT site acquisitions could help move past the current stasis levels of CLT housing production for niche situations. Given the large public benefit that sustainable affordability represents, encouraging greater public investment in CLTs seems an appropriate and effective way to broaden their implementation.

Furthermore, this case demonstrates the difficulty that CLTs face in providing housing for the poorest residents of high-rent areas in a market economy. Because of their reliance on private market funding for both construction and permanent loans, CLT developers must set tenant rent at levels that can repay the loans. In the case of the RCG, that meant establishing a minimum tenant income requirement of 30–60 percent of AMI for non-original tenants, a threshold that can be unaffordable to the lowest-income households who lack Section 8 vouchers (Foster, 2018). Again, expanding public funding sources for CLTs, for instance, by issuing public bonds

to support their site acquisitions, could help lower the development costs to deepen affordability. Still, this case study also indicates the continued need for publicly-funded, social safety net housing in America's cities. CLTs have the potential to be an important component of supplying sustainably affordable housing in cities such as Los Angeles, but they cannot meet housing needs across the entire income spectrum.

In sum, affordability covenants with expiration dates were a short-sighted strategy in the rush to engage the private market in the provision of affordable housing. It is astonishing to imagine that if HUD and state subsidies had been invested into properties with restricted deeds and been oriented around the expansion of actively-engaged stewardship organizations, hard-fought affordability could have been better sustained. This case provides details on both the difficulties and possibilities of developing affordable housing with a more sustainable approach.

Acknowledgments

We would like to thank those that we interviewed for this article, especially the many years of conversation with Sandra McNeill, but also Holly Benson, John London, and Oscar Monge. We also thank the Lincoln Institute of Land Policy for research support.

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Departments

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Data Shop

Data Shop, a department of Cityscape, presents short articles or notes on the uses of data in housing and urban research. Through this department, the Office of Policy Development and Research introduces readers to new and overlooked data sources and to improved techniques in using well-known data. The emphasis is on sources and methods that analysts can use in their own work. Researchers often run into knotty data problems involving data interpretation or manipulation that must be solved before a project can proceed, but they seldom get to focus in detail on the solutions to such problems. If you have an idea for an applied, data-centric note of no more than 3,000 words, please send a one-paragraph abstract to chalita.d.brandly@hud.gov for consideration.

Renters at the Tipping Point of Homeownership: Estimating the Impact of Telework

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Abstract

The COVID-19 pandemic necessitated a large-scale shift toward working from home, leading to a sea change in the level of remote work likely to continue after the pandemic. Previous research has quantified the importance of home location relative to work location (for example, Kneebone and Holmes, 2015), but to date, little work has been done to show the potential impact of an unwinding of that relationship. This analysis quantifies how many renter households could potentially take advantage of teleworking to buy a home. These renter households at the "tipping point" of homeownership are identified using income, industries, and occupations from the 2018 American Community Survey (ACS) rates of teleworking potential from a Bureau of Labor Statistics (BLS) analysis of the American Time Use Survey 2017–2018 (ATUS) and the Zillow Home Value Index (ZHVI) for the lower third of home values in the for-sale market. This analysis finds that 1.92 million U.S. renter households are on the telework tipping point for homeownership. The highest rates of tipping point households are found in expensive west coast markets. For example, more than one-fourth (25.2 percent) of renter households in San Jose could theoretically afford to buy a home in a less pricey locale if they were able to take advantage of more permanent work-from-home policies. In a few metropolitan areas with an extra-expensive principal city,

Abstract (continued)

a sizable share of renter households would have an additional incentive to move to the suburbs—up to 10.4 percent of renter households in the city of San Francisco. Nationwide, Asian renter households have the highest share at the tipping point (9.0 percent), followed by Latinx (5.0 percent), White (4.1 percent), and Black (3.7 percent) renter households. This finding means that the Asian homeownership rate is most likely to have observable increases due to telework. Across metropolitan areas, Black renter households are typically more likely to be at the tipping point (29.0 percent more likely than other racial groups), and Latinx renter households are far less likely (26.2 percent less likely than other racial groups).

Introduction

This article estimates the number of renter households that are at the "telework tipping point" of homeownership—renter households with both high enough incomes to afford the typical starter home outside their city or metropolitan area and employed in "remotable jobs"—jobs that can be performed remotely, that would theoretically allow them to move outside their city or metropolitan area. This analysis examines the magnitude of this set of renter households across metropolitan areas and race categories to determine the potential impact this shift to telework may have on homeownership trends.

A household's choice in housing location has long been tied to employment—in fact, the boundaries of metropolitan areas, as delineated by the Office of Management and Budget (OMB), are determined by commuting patterns. According to OMB, metropolitan and micropolitan statistical areas constitute densely urbanized areas plus "adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties."[1] In a 2019 Zillow survey, renters, buyers, and sellers all said the longest (one-way) commute they would be willing to accept when considering a new home or job was 30 minutes.[2] The close ties between housing and employment could be observed in the negative housing price gradient with respect to city centers in many metropolitan areas—the closer to the urban core, the higher the price premium on homes (Arribas-Bel and Sanz-Gracia, 2014; Fujita, 1989). Close access to employment, proximity to services and amenities, and access to cultural and social opportunities have made urban cores attractive (and more expensive) areas to live in many metropolitan areas relative to outlying areas.

The COVID-19 pandemic suddenly and rapidly loosened those ties between home and work, however. Pew Research found that by October 2020, 71 percent of employed adults who worked in remotable jobs[3] were working from home, compared with only 20 percent before the COVID-19

[1] For more information on metropolitan and micropolitan delineations see https://www.census.gov/topics/housing/housing-patterns/about/core-based-statistical-areas.html.

[2] Compare this with the mean travel time to work of 27.6 minutes from the 2019 American Community Survey. For more detail on Zillow's survey on commute preferences, see: https://www.zillow.com/research/commutes-remote-work-chtr-26506/.

[3] Defined as "workers who say their job responsibilities can mainly be done from home", totaling 38 percent of workers surveyed.

pandemic, with 54 percent saying they would still want to work from home after the pandemic ends (Parker, Horowitz, and Minkin, 2020). An April 2021 poll from Gallup, Inc. found that a majority (51 percent) of U.S. workers overall were still working remotely. The incidence of remote work was concentrated in white-collar workers (72 percent)— particularly those employed in computer/mathematical, media, life science, and financial/consulting fields, each of which had more than 80 percent of workers working remotely (Saad and Jones, 2021).

It is no surprise, then, that metropolitan areas with high concentrations of these white-collar workers experienced large shifts in housing demand throughout the pandemic. San Francisco and New York experienced some of the largest declines in demand for for-sale homes in their urban cores, and rents in urban areas fell steeply in these and other pricey metropolitan areas, including Seattle and Washington, D.C. (Casey, Lee, and Manhertz, 2021). The price premium for dense urban living in these areas evaporated as remote work rose and pandemic restrictions were imposed on many amenities (Gupta et al., 2021; Ramani and Bloom, 2021).

If work-from-home policies persist beyond the pandemic, scores of remote workers renting in the nation's priciest metropolitan areas would theoretically be able to make the jump into homeownership by moving to more affordable areas, taking advantage of the fact that they are no longer locationally tethered to a job. Not only could those renters move in theory, many of them seemingly did: during the past year, metropolitan areas, including Austin, Las Vegas, and Phoenix, that have long been prime destinations for movers from pricey coastal markets have experienced unprecedented home price and rent appreciation (Bachaud and Lee, 2021). There was also a jump in demand for suburban homes within metropolitan areas with pricey urban cores, along with heightened demand for urban homes in metropolitan areas with cheaper urban cores (Casey, Lee, and Manhertz, 2021)

Data

Our objective is to estimate the population of renter households that can afford to buy a starter home outside their metropolitan area but not within and who also work in occupations that are remotable, which theoretically allows them to move and become homeowners in more affordable areas. Our estimates rely on housing affordability data provided by Zillow, telework ability from the American Time Use Survey, and income, race, industry, and occupation data from the American Community Survey (ACS).

Renter incomes, race, industry, and occupation came from the 2018 ACS 1-Year microdata, accessed via Integrated Public Use Microdata Series (IPUMS)-USA (Ruggles et al., 2019). The ACS is an annual survey providing insight into demographics, household structures, housing characteristics, community features, and more, which enables analysis of populations within metropolitan areas and city boundaries.

Rates of teleworking potential came from a Bureau of Labor Statistics (BLS) analysis of the American Time Use Survey (ATUS), which measures the time people spend doing various activities (Dey et al., 2020); a supplement to the 2017–2018 ATUS asked workers whether they could work at home. The authors used ability-to-telework rates by both industry and occupation to classify renter households in ACS by their industry and occupation.

Housing costs were provided by the Zillow Home Value Index (ZHVI),[4] built from millions of property-level estimates of home values—known as Zestimates[5] —to provide a comprehensive measure of home values across various regions and price tiers. This analysis focuses on metropolitan statistical area (MSA) and city-level, bottom-tier ZHVI, the typical value for homes that fall within the 5th to 35th percentile of the empirical distribution for Zestimates in a given region—in other words, the median home value among homes with Zestimates in the 5th to 35th percentile range. This bottom-tier measure was used to approximate the "starter home" segment of housing, which is likely the accessible price tier of homes for first-time homebuyers. The monthly payment necessary to afford this bottom-tier ZHVI value is estimated assuming a 30-year, fixed-rate mortgage with a 3.0-percent interest rate and a 20-percent downpayment, plus estimated taxes, insurance, and homeowners association (HOA) dues. This estimation assumes property taxes of 0.8 percent, insurance costs of $1,000 per year, and HOA as 1/1200th of the home's value per month.

Methodology

Household Telework Ability

The ability to work from home in a given job was reported by the BLS at the individual level and by broad industry classification and occupation classification separately. To estimate a given household's ability to move, first an estimate of each earner's individual probability of telework ability is needed, based jointly on their industry and occupation. Using the distribution of jobs in the ACS, the share of workers in each industry-occupation that could telework is estimated. First, the number of workers with remotable jobs in each industry was derived from the BLS estimated industry-level share who were able to telework and the count of workers in the ACS. That number of jobs was then attributed to occupations within that industry based on the occupation-level share able to telework, assuming conditional independence. By that method, those few working desk jobs in mostly onsite industries are still assigned a higher probability of being able to telework.

A household's ability to telework is assumed to be the income-weighted average of all earners' ability to telework, considering that a household may decide to move given only one member's changing work situation and that the transition would likely be easier if the primary earner maintained his or her job. In aggregate, those probabilities should sum to the total number of households that could feasibly move if allowed to telework. For example, consider earners in a two-earner renter household making $30,000 and $20,000 per year. The first earner is in a job classification (broad industry and occupation category) in which 50 percent of workers can work remotely, whereas the second earner is in a job classification in which only 10 percent can. This analysis estimates that the household has a 34-percent chance of being able to take up telework to move and potentially buy—not that the less remotable earner is expected to be more able to work remotely, but the remotability of the higher earner would facilitate the move if the desire to move were present. Although elements of household structure other than joint remotability of the earners' jobs may have bearing on a household's likelihood of moving, they are not factored in here.

[4] See https://www.zillow.com/research/zhvi-methodology-2019-deep-26226/ for detailed ZHVI methodology.

[5] See https://www.zillow.com/z/zestimate/ for more information on Zestimates.

Affordability

The population of interest in this study was renter households who, by virtue of income, are unable to buy a home in their current metropolitan area but could buy a home elsewhere. Households were categorized by their ability to afford a "starter home"—the average home value between the 5th and 35th percentiles—in their metropolitan area and in the country at large. By that definition, the typical starter home nationally was worth about $131,700 in July 2020, and a starter home was priced higher than that in 37 of the largest 50 metropolitan areas. In those metropolitan areas, a segment of renters exists who may be looking to buy but are precluded from buying in their metropolitan area, although they could buy elsewhere. For example, a hypothetical renter household in the Boston metropolitan area making $50,000 per year would be far short of the almost $72,000 per year required to afford payments on the typical $352,000 starter home in the metropolitan area. The purchase of a starter home outside Boston would tend to cost the same household only about 17 percent of its income, compared with 43 percent in the metropolitan area. A starter home at the city level was also considered to determine the degree of ownership-based outward movement that would be possible in America's most expensive and concentrated cities. A household was considered able to afford a home if the monthly payments on that home's estimated mortgage, insurance, taxes, and HOA or condo fees (given a 20-percent downpayment and a 3-percent interest rate) totaled less than 30 percent of that household's monthly income (the threshold beyond which a household is considered "housing cost burdened"). Combining job remotability and the affordability of buying a home, this analysis derives a number of households on the telework tipping point of homeownership.

Race

Although the ability to telework is doubtlessly intertwined with race, race was not used to estimate ability to telework for the purposes of this study. The only channel for telework determination here was a worker's industry and occupation; thus, differences by race in the ability to telework should be interpreted as differences in the propensity to be in remotable industries and occupations. Four races were considered in this evaluation, defined using general ACS race and ethnicity categories: Latinx/Hispanic and non-Hispanic Asian, Black, and White. Each household was assigned the race of the household head. Renter households of different races were compared on the share of renter households on the telework tipping point for homeownership. Comparisons were made nationally and at the metropolitan statistical area level.

Results

Household Telework Ability

In the United States, the authors estimate that 32.6 percent of *households* are able to telework—a substantially lower proportion than the 43.6 percent of *individuals* able to telework (Dey et al., 2020); a given individual's ability to telework is counterbalanced at the household level by other earners' telework ability and income. Those households able to telework are theoretically freed to move if their remotable jobs continue to be remote indefinitely. Exhibit 1 illustrates that the share of homeowners able to telework is uniformly higher than the share of renter households

able to telework—across all racial groups. The rate is also higher among Asian and White renter households than among Black and Latinx renter households.

Exhibit 1

Households Able to Move if Allowed to Telework, by Renters and Homeowners

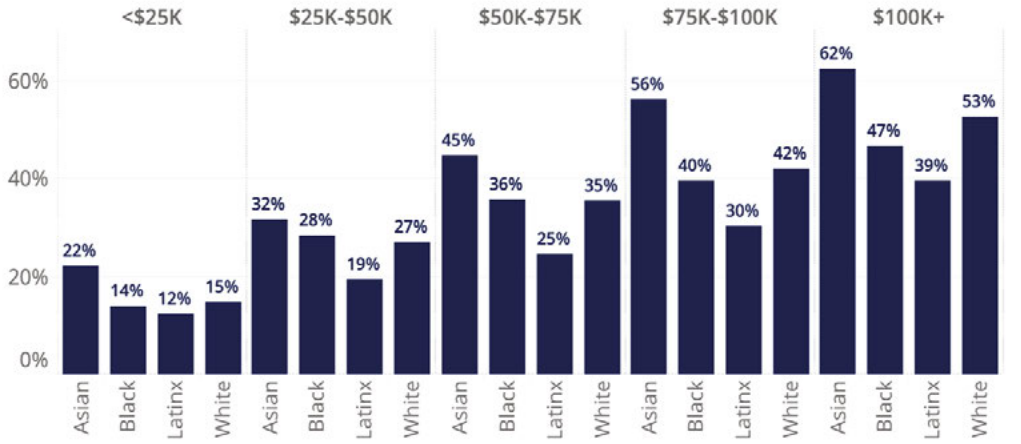
	Renter Households Able to Telework		Homeowner Households Able to Telework	
	Count (#)	Share (%)	Count (#)	Share (%)
National	12,131,687	28.5	26,941,341	34.9
Asian	1,006,652	43.4	1,661,796	47.0
Black	2,138,080	25.7	1,969,965	32.4
Latinx	1,784,280	21.2	2,196,234	28.5
White	6,759,171	30.5	20,554,482	35.3

Sources: American Community Survey; American Time Use Survey

The ability to telework, income, and renter/homeownership status are all correlated, and the differences evident in exhibit 1 may be partly explained by differences in income for homeowners and renters. Among all households, only 14.4 percent earning less than $25,000 can telework, compared with a majority (51.1 percent) of households making more than $100,000 (exhibit 2).

Exhibit 2

Share of Renter Households that Could Telework, by Race and Income



Sources: American Community Survey; American Time Use Survey

Affordability

Among renters, 18.2 percent of households are unable to afford a monthly payment on a typical local starter home in their current metropolitan area but *could* afford the typical starter home priced at or less than the national standard. For those households, the ability to telework might make the difference between buying and continuing to rent. As shown in exhibit 3, many renter households can already afford the monthly payments on a home, but do not currently own. Possible reasons that renter households do not own a home although they can already afford to make the payments

include insufficient down payment savings, a desire to enter at a higher price point, preference for renting, or any number of other reasons.

Exhibit 3

Renter Households Able to Afford a Starter Home, Nationally and by Race

	Renter Households Able to Afford Buying in Current Metropolitan Area		Renter Households Able to Afford Buying Nationally but Not in Current Metropolitan Area		Renter Households Unable to Afford Buying in Metropolitan Area or Nationally	
	Count (#)	Share (%)	Count (#)	Share (%)	Count (#)	Share (%)
National[1]	17,550,476	50.5	6,311,597	18.2	10,905,500	31.4
Asian	1,109,529	50.7	541,709	24.8	535,365	24.5
Black	3,335,479	46.6	942,795	13.2	2,875,130	40.2
Latinx	3,064,267	39.8	2,004,448	26.1	2,622,663	34.1
White	9,506,884	57.1	2,596,963	15.6	4,538,581	27.3

[1]*National figures exclude renter households in non-metropolitan areas.*

Sources: American Community Survey; Zillow

In the race breakout, a much higher share of Asian and Latinx renter households have incomes that put them between the price points of their local starter homes and starter homes nationally. The share of renter households that can afford to buy a home nationally but not in their current metropolitan area is 24.8 percent and 26.1 percent among Asian and Latinx households, respectively, compared with only 18.2 percent among all renter households. This finding has a large geographical component. More of these populations live in areas where local home prices are well above national standards, thus there is more room to be in the middle (Manhertz, 2020)—that is to say, more of these populations live in areas where the bar to entry for homeownership is extremely high. For those households, the ability to telework has the largest potential impact.

The Tipping Point[6]

Looking at the intersection of renters that are (1) able to afford buying nationally but not in their current metropolitan area and (2) able to telework, the authors find that a switch to more telework could give 4.5 percent of renter households (1.92 million U.S. renters) the option to leave the metropolitan areas where they currently live and buy a starter home in a cheaper locale. That 18.2 percent of renters—whose income would allow them to buy a starter home in the national market but not in their metropolitan area—have a lower rate of being able to telework than the national average, about 24.7 percent, yielding 4.5 percent on the telework tipping point.

$$Share\ of\ Renter\ Households\ on\ the\ Telework\ Tipping\ Point\ of\ Homeownership = \frac{\sum_{i=1}^{n} TeleworkProbability_i \times \begin{cases} 1, if\ p_1 \leq MaxPrice(HHIncome_i) < p_2 \\ 0, Otherwise \end{cases}}{n},$$

where $p_1$is the national starter home value and p_2 is the metropolitan area starter home value for renter i.

[6] See appendix A for full results of all metropolitan areas analyzed.

Exhibit 4 shows that this share is higher, nationally, among Asian renter households (9.0 percent), followed by Latinx renter households (5.0 percent). Black renter households have the lowest share on the tipping point nationally, at 3.7 percent. As discussed previously, geography plays a role. The high share of Asian and Latinx renter households is attributable in large part to more members of these communities living in more expensive markets, notably many California metropolitan areas. More than one third (35 percent) of the nation's Asian households live in the New York, San Francisco, San Jose, or Los Angeles metropolitan areas—four markets that are home to only about 12 percent of the nation's total households (Lee, 2021). These groups are disproportionately unable to buy a home due to geography, which has historically been closely tied to work.

At the metropolitan area level, Black renter households tend to have the highest share on the telework tipping point for homeownership. This finding was true in 28 of the largest 50 metropolitan areas that had any tipping point at all, and 8 of the largest 10.

Exhibit 4

Share of Renter Households at the Telework Tipping Point of Homeownership, by Race, Nationally and for the 10 Largest Metropolitan Areas

	All	Asian	Black	Latinx	White
United States	4.5%	9.0%	3.7%	5.0%	4.1%
New York, NY	7.4%	7.5%	8.9%	6.2%	7.4%
Los Angeles-Long Beach-Anaheim, CA	17.2%	19.8%	19.5%	13.2%	20.0%
Chicago, IL	1.1%	0.5%	1.2%	0.8%	1.3%
Dallas-Fort Worth, TX	3.2%	1.7%	5.5%	2.4%	2.5%
Philadelphia, PA	1.2%	1.3%	1.6%	0.7%	1.2%
Houston, TX	1.6%	1.2%	2.5%	0.9%	1.7%
Washington, D.C.	8.6%	7.0%	10.0%	6.7%	8.3%
Miami-Fort Lauderdale, FL	3.1%	3.0%	3.7%	2.7%	3.2%
Atlanta, GA	2.2%	1.4%	2.5%	2.0%	2.1%
Boston, MA	10.3%	11.1%	12.5%	7.3%	10.6%

Sources: American Community Survey; American Time Use Survey; Zillow

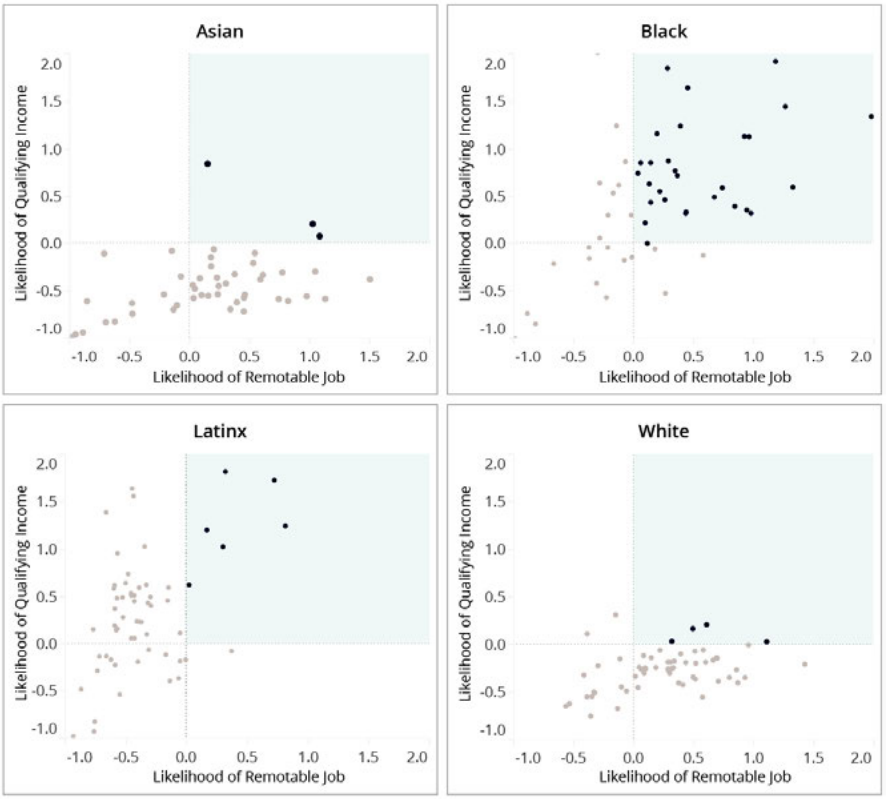
The share of a given group that is on the tipping point depends on both the job classification and the incomes of renters; those renter households at the tipping point tend to hold lower- and middle-income desk jobs. Exhibit 5 shows that, more than any other race across metropolitan areas, Black renter households are the most likely to both earn an income that would allow them to achieve homeownership elsewhere and to earn that income in a job that is remotable. For each race, the plots separate the components of being on the tipping point in each metropolitan area. On the x-axis is the odds ratio of a worker of that race, relative to other races, being in the right income range to be at the tipping point, given that they are in a remotable job. On the y-axis is the reverse, the odds ratio of a worker of that race, relative to other races, being in a remotable job given that they are in the right income range to be at the tipping point. The graph shows why certain races are more or less likely to be on the tipping point. White and Asian renters in remotable jobs clearly are less likely to be in the income range to have to move to buy a home—

that is, they have higher incomes. Also clear is that Latinx renters in the right income range are less likely to be working in remotable jobs and so less likely to be on the telework tipping point.

Among large metropolitan areas, in fairly few did any group other than Black renter households have both a relatively high likelihood of telework given qualifying incomes and a high likelihood of qualifying incomes given the ability to telework. At the median among the largest 50 metropolitan areas, Black renter households are 29 percent more likely than other renters to be able to buy their first home in a less expensive area from which they could potentially telecommute to their current job. Asian, Latinx, and White renter households are 19 percent, 26.2 percent, and 0.6 percent less likely, respectively, than other renters to be able to telecommute and buy.

Exhibit 5

Likelihood of Qualifying Income (Remotable Jobs Only) and Likelihood of Remotable Job (Qualifying Incomes Only), Relative to Other Races



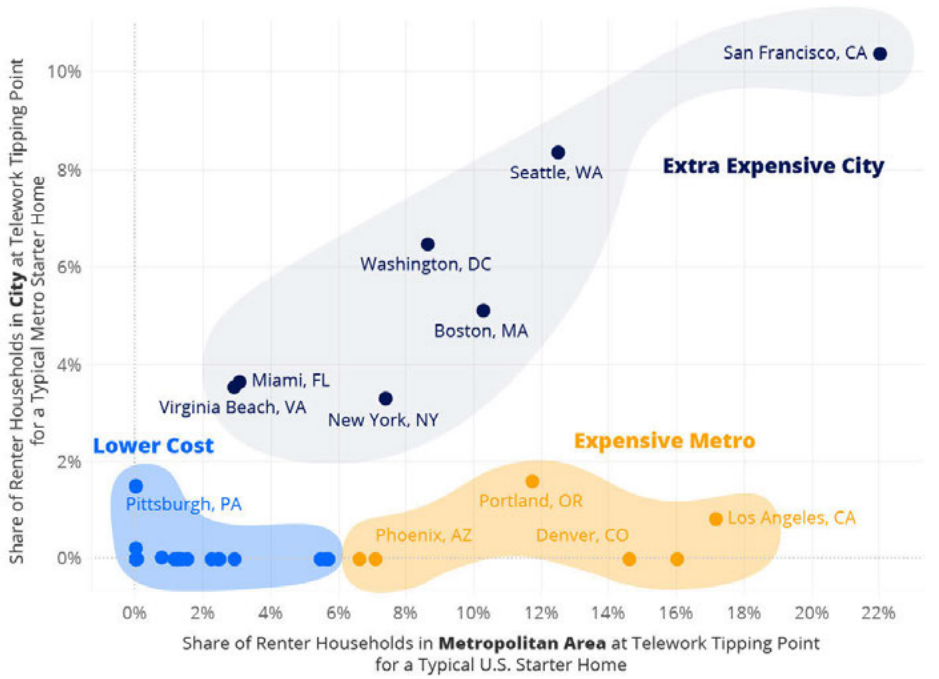
Sources: American Community Survey; American Time Use Survey; Zillow

Not all large metropolitan areas have entry-level price points higher than the United States. In those metropolitan areas (for example, Detroit, Kansas City, Memphis, Buffalo), no tipping point exists as defined in the study. Renter households there are generally no more likely to find an affordable first home to buy outside the metropolitan area than they are within it. Some of the densest metropolitan areas, however, very clearly have two tipping points: one across the barrier to buy

a home in the metropolitan area overall and another across the barrier to buy a home specifically within the main job center of the metropolitan area (the reason for its density). A starter home is worth more in a metropolitan area's namesake city than it is in the metropolitan area as a whole in 20 of the nation's 50 largest metropolitan areas (and in 11 of the 27 metropolitan areas where income data were available on occupations at the city level). The degree of this principal city price premium varies greatly, and it is the relatively affordable starter homes (within the context of the metropolitan area) that separate Los Angeles and San Jose from San Francisco and Portland from Seattle. Exhibit 6 shows the additional share of renter households in the city that are on the tipping point in their city, with a clear price incentive to move elsewhere in their metropolitan area. In San Francisco and Seattle, a large share of renter households currently living in the city could telework and buy a starter home outside the city but still within the metropolitan area (10.4 percent and 8.4 percent, respectively). In Los Angeles and Portland, the share is much smaller (0.8 percent and 1.6 percent, respectively). This steep gradient to homeownership can leave many more on the telework tipping point in the most expensive cities; however, in many other cities—including Minneapolis, Phoenix, and Denver—a starter home within city limits is more affordable than in the larger metropolitan area, leaving city residents with no price incentive to leave for the suburbs.

Exhibit 6

Share of Renter Households at the Telework Tipping Point for a Typical Starter Home, by Metropolitan Area and City[7]



Sources: American Community Survey; American Time Use Survey; Zillow

[7] Exhibit 6 includes all of the largest 100 metropolitan areas for which city-level data were available for the principal city. Groupings of metropolitan areas are based on tipping point outcomes and serve as an aid in intuition rather than a stringent classification.

Limitations and Potential for Expansion

This study estimates the size of the subpopulation that is at a homeownership tipping point—able to take advantage of geographic flexibility from telework to pursue more affordable homeownership opportunities. COVID-19 necessitated workplace flexibility, which will potentially decouple employment and housing decisions. Remote work opens the possibility of homeownership to a substantial number of households. Renters, who have fewer barriers to moving, could theoretically react faster to that change. Those on the cusp of buying a home have also been given a new sense of urgency by the combination of historically low interest rates (which help keep monthly payments manageable, assuming an adequate downpayment has been saved) and rising prices (which, for those saving for a downpayment, can feel like a moving target; today's savings may be inadequate at tomorrow's prices). In recent years, many people may have decided to postpone homeownership to stay in or near a job center—a consideration that may be less important today. This slice of data at the intersection of affordability and the new work environment is emblematic of the times, but it cannot reveal the whole picture, especially in this highly controlled framework. The present research serves to identify the scale and direction of incentives out of highly concentrated job and housing markets, but avenues to refine and expand on this work remain.

One direction for future research is more complete use of the data. Both of the surveys used in this research can be leveraged more fully to get a clearer picture of telework ability at the local level. The cited BLS article was the sole source used for identification of job remotability. More granular mapping of estimates from the ATUS to the ACS 5-year microdata would give a more precise picture of local effects. The industry-occupation category mapping of remotability is insensitive to age, income, geography, and race, which could all be informative. Job remotability was also considered to be binary, whether the individual worker "worked entirely at home on some days," meaning that whether the employee could completely relocate or would still need or be required to be physically present in an office with some regularity is uncertain. Further study could determine the threshold of telework hours that implies fully remote work is possible at a finer level. In addition, as remote work and its adoption continue to evolve, the remotability of certain industries and occupations may end up differing from the findings from the 2017–2018 ATUS supplement used; the pandemic likely spurred some industries and occupations in the direction of remotability.

A second direction for future research is modeling the complexity of a household's decision to move. The issue of a household's propensity to change homes in response to remote work carries additional complexity not addressed here. Moving is dependent on personal investment in a community as well as numerous individual factors, including savings, marital status, presence and age of children, and so on. In this analysis, the telework ability of a household was taken to be a weighted average among earners in the household, but predicting who is most likely to move on the incentive of homeownership is an open question. Also open is the inverse question of who could obtain a better paid remote job and newly afford a home without leaving their metropolitan area.

A third direction for future research is to expand the scope of the analysis to include housing decisions beyond the transition from renting to homeownership. This study focuses on a homeownership tipping point, which, by definition, means that the effects explored here only

describe a population on the margin, a small subset of potential first-time buyers. The preexisting economic and demographic factors driving demand for housing, combined with the particular economic circumstances of the COVID-19 pandemic, have meant that the question of whether to relocate has been raised more than ever. Many of the same issues that affect renters on the telework tipping point of homeownership affect other groups: renters seeking cheaper rents or parting from roommates, homeowners deciding whether to sell and buy again or refinance. All telework-capable members of those groups are evaluating whether their current location and home are still appropriate. The incentives for each group are different, and although the direction of movement out of relatively expensive areas is likely to be the same, the destination and scale will be different in each case. As larger groups, their movements will do more to affect the market at large than the limited set examined here. Investigating those housing decisions through a formal decision-theoretic framework could provide additional insight into the relative tradeoffs and costs considered by households.

Assumptions

Many assumptions in this study were designed to identify source locations of moves and yield comparable scales of potential moves between source locations and between races. All these assumptions bear further study. The ability to afford a typical starter home is not enough reason to think someone will actually buy a home. The use of a national typical starter home as the bar for homeownership excludes about one-sixth of homes, which could be viable entry points into the for-sale market, particularly when accounting for the needs of different household types and sizes; for example, a starter home for a couple household could be smaller and cheaper than a starter home for a multigenerational household. This threshold, however, was chosen to be a reasonable entry level that was not so low as to be absent from most of the country. Further research could identify the price points and most likely destinations sought out by the first-time buyers most able to telework.

In addition, our threshold for affordability of 30 percent of income is relatively high. The typical homeowner nationally and in most metropolitan areas spends less than 30 percent of their income on housing. Nationally, the median share of income spent on housing among homeowners with a mortgage is 20.8 percent, according to the 2019 ACS. Renter households considering homeownership might not want to exceed the typical homeowner housing cost burden in an area or exceed their current renting cost burden. This affordability threshold also assumes that households have the ability to pay for a 20 percent downpayment, however, and have no other large debts (such as student loans) or other financial hurdles that would preclude them from qualifying for a mortgage. Further analysis could include sensitivities to differentiated thresholds for affordability.

Whether a household can move in response to telework may be complicated. The share of household members' earned incomes is a large piece, but so are many other factors, including other costs of living and lifestyle preferences. Identifying and accounting for those factors would refine the estimate of the response to telework for renters and homeowners. In addition, many workers in remotable jobs may be subject to location-based pay scale changes; workers moving

from an expensive labor market to a cheaper one may see a pay cut that dampens the housing affordability benefits to moving.

Implications and Policy Considerations

Although not all workers who teleworked during the pandemic will continue to do so indefinitely, a shift in work expectation and business practices has occurred such that more acceptance and take-up of telework among workers with that option in the coming years can be anticipated (Barrero, Bloom, and Davis, 2021). Previous research has shown the impact of job location on where a home is bought and that job market concentration has a close correspondence with high home prices and home price growth. Thus, for renters seeking homeownership while maintaining a job, the cost of entry is set ever higher. Many who could afford a house elsewhere have not been able to buy a home in their metropolitan area because they work in an expensive job center where prices have stayed ahead of them. The advent of remote work presents an opportunity for homeownership for renter households that have otherwise been priced out of owning in their metropolitan area, and our findings suggest that this opportunity is particularly common in Black households who have, as a group, long experienced disparities in homeownership rates and corresponding wealth creation (Ray et al., 2021).

The disparity in home values across the country has not occurred by chance, however—strict land use regulations have created the conditions for outsized home price appreciation in the nation's most expensive markets. Historically, job growth and home value growth go hand in hand, but the more restrictive a metropolitan area's land use regulations, the faster home values appreciate with that same level of job growth (Tucker, 2018). Metropolitan areas with restrictive land use are least able to increase housing supply to meet demand. Those same expensive, restrictive metropolitan areas have seen increased out-migration to lower cost and lower population areas during the pandemic (Whitaker, 2021)—a continuation and acceleration of a decade-long trend. As those destinations experience sudden and large levels of in-migration, particularly of relatively higher wage movers from higher cost areas, they will continue to face many of the same challenges that have historically plagued expensive metropolitan areas. Metropolitan areas experiencing high in-migration will need to ensure that their housing supply keeps up with demand and, more generally, that infrastructure can support a growing population—or else face the consequences of rapidly rising home prices and unaffordability still apparent in high-cost metropolitan areas.

Those lower-cost, smaller destination metropolitan areas also stand to gain from this increased demand; a larger tax base, higher consumption, and larger share of knowledge workers may revitalize or help maintain the economic standing of those areas. Lowered demand pressures for housing in high-cost metropolitan areas may also, over the long term, lead to a moderation in prices.

Still, most moves are local, not across metropolitan areas. Available data on 2020 migration points to similar trends as before—the vast majority (84 percent) of moves occur within the same metropolitan area, with a marked shift away from urban cores to more affordable suburban regions (Patino, Kessler, and Holder, 2021). Particularly in expensive, coastal metropolitan areas, this demand shift was drastic enough to reverse the price premium traditionally commanded by proximity to job centers. A substantial reallocation of demand away from city centers toward

city suburbs has occurred for the largest metropolitan areas in the United States such that central business districts and dense areas have experienced relative price decreases compared with less dense areas (Ramani and Bloom, 2021). Many renters at the telework tipping point of homeownership in the center cities of those metropolitan areas have the choice of moving near or far in search of relative housing affordability—across the country or simply to the suburbs. The advent of remote work and out-migration does not absolve local governments in high-cost metropolitan areas with severe housing shortages from seeking solutions that expand the local housing stock.[8] Continuing price appreciation and rising unaffordability in the nation's most costly metropolitan areas means that housing scarcity has not been appreciably counterbalanced by reduced demand, although relative demand within those metropolitan areas might have shifted outward to the suburbs during the pandemic, at least for the short term.

Although the pandemic has had a drastic impact on the housing market, it has not rewritten the script; the most expensive and unaffordable markets of the country have largely remained unchanged. Shifts in demand have supercharged housing markets in certain pockets of the country, but long-term effects on price and affordability remain to be seen. Remote work is unlocking homeownership opportunities for a segment of renters, but longstanding drivers of housing scarcity, and in turn unaffordability, remain challenges for communities nationwide.

[8] See, for example, the Q2 2021 Zillow Home Price Expectations Survey, surveying a panel of housing experts on the most practical and effective actions to increase the U.S. housing supply. Fifty-six percent of panelists chose "relaxing zoning rules" as one of up to three main factors to help increase housing supply, and it was scored as the most effective single strategy. https://www.zillow.com/research/zhpe-zoning-housing-supply-q22021-29600/.

Appendix A

CBSA Name	Size Rank	Renter Households on the METROPOLITAN AREA Telework Tipping Point for Homeownership						Renter Households on the CITY Telework Tipping Point for Homeownership	
		Count	Share					Count	Share
			All Races	Asian	Black	Latinx	White		
United States	0	1921862	4.5%	9.0%	3.7%	5.0%	4.1%		
New York-Newark-Jersey City, NY-NJ-PA	1	253400	7.4%	7.5%	8.9%	6.2%	7.4%	68988	3.3%
Los Angeles-Long Beach-Anaheim, CA	2	377014	17.2%	19.8%	19.5%	13.2%	20.0%	7035	0.8%
Chicago-Naperville-Elgin, IL-IN-WI	3	13721	1.1%	0.5%	1.2%	0.8%	1.3%	0	0.0%
Dallas-Fort Worth-Arlington, TX	4	33333	3.2%	1.7%	5.5%	2.4%	2.5%	0	
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	5	9225	1.2%	1.3%	1.6%	0.7%	1.2%	0	0.0%
Houston-The Woodlands-Sugar Land, TX	6	14360	1.6%	1.2%	2.5%	0.9%	1.7%	0	
Washington-Arlington-Alexandria, D.C.-VA-MD-WV	7	68245	8.6%	7.0%	10.0%	6.7%	8.3%	10235	6.5%
Miami-Fort Lauderdale-West Palm Beach, FL	8	25582	3.1%	3.0%	3.7%	2.7%	3.2%	4471	3.6%
Atlanta-Sandy Springs-Roswell, GA	9	16893	2.2%	1.4%	2.5%	2.0%	2.1%	0	
Boston-Cambridge-Newton, MA-NH	10	72599	10.3%	11.1%	12.5%	7.3%	10.6%	8811	5.1%
San Francisco-Oakland-Hayward, CA	11	164571	22.0%	22.8%	18.0%	16.8%	24.5%	23081	10.4%
Detroit-Warren-Dearborn, MI	12	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.0%
Riverside-San Bernardino-Ontario, CA	13	30345	6.4%	7.5%	7.4%	6.0%	5.9%	0	
Phoenix-Mesa-Scottsdale, AZ	14	43191	7.1%	7.0%	8.9%	6.0%	7.0%	0	0.0%
Seattle-Tacoma-Bellevue, WA	15	75660	12.5%	10.6%	14.3%	10.5%	12.9%	15322	8.4%
Minneapolis-St. Paul-Bloomington, MN-WI	16	27571	6.6%	4.7%	6.5%	10.1%	6.3%	0	0.0%
San Diego-Carlsbad, CA	17	79369	15.4%	14.5%	21.3%	12.8%	16.3%	0	
St. Louis, MO-IL	18	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.0%
Tampa-St. Petersburg-Clearwater, FL	19	9058	2.2%	0.0%	1.9%	2.9%	2.1%	0	
Baltimore-Columbia-Towson, MD	20	8344	2.5%	2.0%	3.1%	0.5%	2.2%	0	0.0%

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		Count	Share					Count	Share
			All Races	Asian	Black	Latinx	White		
Denver-Aurora-Lakewood, CO	21	61321	14.6%	12.7%	18.3%	10.4%	15.9%	0	0.0%
Pittsburgh, PA	22	0	0.0%	0.0%	0.0%	0.0%	0.0%	1104	1.5%
Portland-Vancouver-Hillsboro, OR-WA	23	41857	11.7%	10.3%	7.5%	10.7%	12.1%	2005	1.6%
Charlotte-Concord-Gastonia, NC-SC	24	5389	1.6%	1.4%	2.4%	0.9%	1.2%	0	
Sacramento--Roseville--Arden-Arcade, CA	25	33573	10.5%	8.2%	9.5%	8.6%	11.6%	0	
San Antonio-New Braunfels, TX	26	3042	1.0%	0.6%	2.7%	0.9%	0.7%	0	
Orlando-Kissimmee-Sanford, FL	27	11447	3.5%	1.7%	3.6%	3.4%	3.4%	0	
Cincinnati, OH-KY-IN	28	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Cleveland-Elyria, OH	29	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.0%
Kansas City, MO-KS	30	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Las Vegas-Henderson-Paradise, NV	31	18873	5.3%	5.3%	4.7%	4.6%	5.8%	0	
Columbus, OH	32	15	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Indianapolis-Carmel-Anderson, IN	33	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.0%
San Jose-Sunnyvale-Santa Clara, CA	34	71410	25.2%	27.8%	27.1%	18.7%	26.3%	0	
Austin-Round Rock, TX	35	30625	9.5%	7.2%	10.8%	7.6%	10.4%	0	
Virginia Beach-Norfolk-Newport News, VA-NC	36	7191	2.9%	0.7%	2.8%	3.0%	2.8%	2148	3.5%
Nashville-Davidson--Murfreesboro--Franklin, TN	37	14201	5.4%	8.6%	8.1%	1.5%	4.9%	0	
Providence-Warwick, RI-MA	38	12892	5.5%	5.7%	5.1%	5.8%	5.6%	0	0.0%
Milwaukee-Waukesha-West Allis, WI	39	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.0%
Jacksonville, FL	40	2529	1.2%	0.0%	2.3%	0.7%	0.7%	0	0.0%
Memphis, TN-MS-AR	41	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Oklahoma City, OK	42	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Louisville/Jefferson County, KY-IN	43	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Hartford-West Hartford-East Hartford, CT	44	2270	1.5%	1.4%	2.2%	1.5%	1.4%	0	0.0%

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		Count	Share					Count	Share
			All Races	Asian	Black	Latinx	White		
Richmond, VA	45	3714	2.2%	2.2%	2.7%	1.1%	2.1%	0	0.0%
New Orleans-Metairie, LA	46	1333	0.8%	0.1%	1.1%	0.0%	0.6%	25	0.0%
Buffalo-Cheektowaga-Niagara Falls, NY	47	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.0%
Raleigh, NC	48	10698	5.9%	4.6%	7.1%	3.3%	5.6%	0	
Birmingham-Hoover, AL	49	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Salt Lake City, UT	50	18775	14.1%	7.5%	6.1%	12.1%	15.8%	0	
Rochester, NY	51	0	0.0%	0.0%	0.0%	0.0%	0.0%	775	1.5%
Grand Rapids-Wyoming, MI	52	2694	2.9%	12.4%	5.4%	2.2%	2.1%	0	0.0%
Tucson, AZ	53	3715	2.5%	1.1%	3.8%	2.1%	2.7%	0	
Urban Honolulu, HI	54	14999	11.0%	9.6%	17.1%	9.3%	12.4%	0	
Fresno, CA	56	4995	3.4%	2.9%	4.4%	2.6%	3.9%	0	
Worcester, MA-CT	57	6572	5.7%	14.0%	4.2%	4.7%	5.3%	0	0.0%
Bridgeport-Stamford-Norwalk, CT	58	6514	5.6%	4.4%	4.6%	5.1%	6.8%	0	0.0%
Albuquerque, NM	59	3813	3.1%	0.0%	1.0%	2.9%	3.6%	0	
Albany-Schenectady-Troy, NY	60	1512	1.2%	0.1%	1.9%	0.0%	1.2%	0	0.0%
Omaha-Council Bluffs, NE-IA	61	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
New Haven-Milford, CT	62	1754	1.4%	3.0%	1.4%	1.5%	0.8%	0	0.0%
Bakersfield, CA	63	1809	1.6%	5.9%	1.4%	1.1%	2.1%	0	
Knoxville, TN	64	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Greenville-Anderson-Mauldin, SC	65	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Oxnard-Thousand Oaks-Ventura, CA	66	14412	14.3%	21.9%	14.6%	12.8%	14.6%	0	
Allentown-Bethlehem-Easton, PA-NJ	67	1274	1.3%	0.0%	0.0%	1.9%	1.2%	0	0.0%
El Paso, TX	68	0	0.0%	0.0%	0.0%	0.0%	0.0%	205	0.2%
Baton Rouge, LA	69	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Dayton, OH	70	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	

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			All Races	Asian	Black	Latinx	White		
McAllen-Edinburg-Mission, TX	71	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Columbia, SC	72	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Greensboro-High Point, NC	73	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Akron, OH	74	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.0%
North Port-Sarasota-Bradenton, FL	75	2353	2.8%	2.0%	5.4%	4.3%	2.1%	0	
Little Rock-North Little Rock-Conway, AR	76	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.0%
Stockton-Lodi, CA	77	5566	5.3%	4.0%	10.3%	3.9%	5.6%	0	
Charleston-North Charleston, SC	78	2375	2.5%	0.0%	2.5%	1.4%	2.6%	0	
Syracuse, NY	79	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.0%
Colorado Springs, CO	80	7883	8.8%	4.2%	11.8%	9.5%	8.6%	0	
Winston-Salem, NC	81	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Wichita, KS	82	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Springfield, MA	83	2057	2.4%	0.0%	4.5%	2.5%	2.0%	0	0.0%
Cape Coral-Fort Myers, FL	84	1916	2.6%	0.0%	1.4%	2.9%	2.7%	0	
Boise City, ID	85	8168	10.6%	4.2%	37.6%	7.2%	11.1%	0	
Toledo, OH	86	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.0%
Lakeland-Winter Haven, FL	88	9	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Ogden-Clearfield, UT	89	3964	8.4%	0.1%	61.1%	5.4%	8.3%	0	
Deltona-Daytona Beach-Ormond Beach, FL	90	1827	2.7%	0.0%	2.7%	5.1%	2.3%	0	
Des Moines-West Des Moines, IA	91	32	0.0%	0.0%	0.1%	0.0%	0.0%	0	0.0%
Jackson, MS	92	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Youngstown-Warren-Boardman, OH-PA	93	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Augusta-Richmond County, GA-SC	94	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Scranton-Wilkes-Barre--Hazleton, PA	95	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	

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Harrisburg-Carlisle, PA	96	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Palm Bay-Melbourne-Titusville, FL	97	689	1.3%	0.8%	0.2%	1.2%	1.5%	0	
Chattanooga, TN-GA	98	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Spokane-Spokane Valley, WA	99	4034	4.7%	3.7%	11.7%	2.2%	4.9%	0	
Provo-Orem, UT	100	8346	16.0%	18.1%	0.0%	12.8%	16.5%	0	0.0%
Lancaster, PA	101	1520	2.4%	10.8%	0.0%	0.9%	2.6%	0	
Modesto, CA	102	3734	5.2%	9.7%	10.3%	4.3%	5.0%	0	
Portland-South Portland, ME	103	5226	7.9%	10.0%	37.1%	11.0%	6.2%	0	
Santa Rosa, CA	105	10610	14.8%	19.0%	8.5%	10.1%	17.3%	0	
Lafayette, LA	107	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Lansing-East Lansing, MI	108	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Fayetteville-Springdale-Rogers, AR-MO	109	591	0.8%	0.0%	0.0%	0.6%	1.0%	0	
Pensacola-Ferry Pass-Brent, FL	110	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Visalia-Porterville, CA	111	1041	1.8%	0.3%	0.0%	2.3%	1.1%	161	0.9%
Shreveport-Bossier City, LA	112	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Springfield, MO	113	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
York-Hanover, PA	114	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Corpus Christi, TX	115	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Reno, NV	117	7800	10.1%	10.4%	1.4%	5.7%	11.4%	0	
Asheville, NC	118	2743	4.1%	0.0%	3.8%	1.3%	4.5%	0	
Port St. Lucie, FL	119	630	1.4%	0.0%	0.9%	4.0%	1.1%	0	
Santa Maria-Santa Barbara, CA	120	5825	8.5%	4.7%	0.0%	6.0%	12.2%	0	
Huntsville, AL	121	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Fort Wayne, IN	122	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Salinas, CA	123	6506	9.6%	9.7%	17.2%	6.9%	14.1%	0	0.0%

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		Count	Share					Count	Share
			All Races	Asian	Black	Latinx	White		
Vallejo-Fairfield, CA	124	7755	14.0%	4.4%	21.4%	7.7%	14.7%	0	
Mobile, AL	125	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Reading, PA	126	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Brownsville-Harlingen, TX	127	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Canton-Massillon, OH	129	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Beaumont-Port Arthur, TX	130	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.0%
Manchester-Nashua, NH	131	3186	6.2%	0.0%	2.7%	5.8%	6.9%	0	0.0%
Anchorage, AK	133	1662	3.3%	11.9%	0.0%	2.1%	3.2%	289	0.8%
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	136	2	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Montgomery, AL	137	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Salisbury, MD-DE	138	1129	2.8%	0.0%	3.1%	0.2%	2.2%	0	
Gulfport-Biloxi-Pascagoula, MS	139	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Trenton, NJ	141	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Fayetteville, NC	142	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Hickory-Lenoir-Morganton, NC	143	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Eugene, OR	145	5877	9.4%	11.2%	17.2%	8.2%	9.2%	0	
Rockford, IL	146	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Ann Arbor, MI	148	1853	3.4%	5.4%	5.2%	1.5%	2.3%	1667	6.4%
Ocala, FL	149	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Kalamazoo-Portage, MI	150	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Naples-Immokalee-Marco Island, FL	151	919	2.5%	2.7%	2.0%	2.1%	2.8%	0	
Spartanburg, SC	153	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Roanoke, VA	156	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Lincoln, NE	158	1092	2.3%	0.0%	0.2%	0.2%	2.8%	0	0.0%

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Fort Collins, CO	159	6163	12.2%	16.2%	21.1%	8.9%	12.5%	0	
Utica-Rome, NY	160	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Lubbock, TX	163	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Erie, PA	164	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.0%
Atlantic City-Hammonton, NJ	167	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Norwich-New London, CT	168	494	1.4%	2.3%	0.0%	0.8%	1.6%	0	
San Luis Obispo-Paso Robles-Arroyo Grande, CA	169	6255	15.7%	41.6%	86.5%	8.2%	16.9%	0	
Gainesville, FL	170	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Santa Cruz-Watsonville, CA	171	6483	17.5%	3.3%	28.7%	13.0%	21.5%	0	
Clarksville, TN-KY	172	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Merced, CA	174	590	1.7%	0.3%	1.6%	1.4%	2.7%	0	
Wilmington, NC	175	987	2.1%	0.0%	3.0%	0.1%	2.1%	0	
Waco, TX	178	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Olympia-Tumwater, WA	179	3671	9.3%	11.3%	9.9%	2.8%	9.5%	0	
Amarillo, TX	180	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Binghamton, NY	181	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Bremerton-Silverdale, WA	183	2576	8.3%	4.8%	11.1%	7.1%	8.5%	0	
Laredo, TX	184	0	0.0%	0.0%	0.0%	0.0%	0.0%	28	0.1%
Lynchburg, VA	185	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Yakima, WA	186	175	0.6%	0.0%	0.0%	0.6%	0.4%	0	
Topeka, KS	188	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Champaign-Urbana, IL	190	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Tuscaloosa, AL	191	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
College Station-Bryan, TX	192	14	0.0%	0.0%	0.0%	0.1%	0.0%	0	

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			All Races	Asian	Black	Latinx	White		
Charleston, WV	194	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Chico, CA	196	1457	4.0%	0.0%	9.9%	2.9%	4.3%	0	
Barnstable Town, MA	199	1164	6.4%	5.9%	7.8%	10.6%	6.1%	0	
Burlington-South Burlington, VT	201	1382	4.6%	4.9%	7.9%	13.5%	4.0%	0	
Prescott, AZ	202	1423	5.3%	26.6%	0.0%	11.1%	3.7%	0	
Springfield, IL	203	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Tyler, TX	204	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Las Cruces, NM	205	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Houma-Thibodaux, LA	207	0	0.0%		0.0%	0.0%	0.0%	0	
Florence, SC	209	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Medford, OR	210	1823	6.2%	9.9%	0.0%	11.3%	5.3%	0	
Lafayette-West Lafayette, IN	211	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Bellingham, WA	212	4283	12.8%	0.0%	1.6%	11.5%	14.6%	0	
Lake Havasu City-Kingman, AZ	213	1168	4.3%	1.1%	8.7%	3.6%	4.4%	0	
Saginaw, MI	214	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Elkhart-Goshen, IN	217	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Yuma, AZ	218	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Racine, WI	219	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Hilton Head Island-Bluffton-Beaufort, SC	223	1034	4.8%	0.0%	5.4%	2.1%	5.2%	0	
Bloomington, IL	224	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Daphne-Fairhope-Foley, AL	228	436	2.1%	0.0%	0.0%	1.7%	2.5%	0	
Gainesville, GA	229	439	2.2%	1.4%	8.9%	0.7%	0.5%	0	
Blacksburg-Christiansburg-Radford, VA	231	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Redding, CA	233	617	2.8%	0.0%	7.7%	4.4%	1.9%	0	
Monroe, LA	234	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	

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			All Races	Asian	Black	Latinx	White		
Joplin, MO	235	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
El Centro, CA	236	317	2.4%	20.5%	0.0%	2.3%	0.0%	0	
Muskegon, MI	238	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
East Stroudsburg, PA	239	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Greenville, NC	241	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Oshkosh-Neenah, WI	243	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Yuba City, CA	244	930	4.0%	12.3%	0.0%	2.2%	4.9%	0	
Columbia, MO	246	553	1.7%	5.0%	0.0%	0.0%	1.8%	0	
Dover, DE	247	227	1.1%	0.0%	2.0%	0.0%	0.5%	0	
Eau Claire, WI	248	42	0.2%	0.0%		0.0%	0.2%	0	
Janesville-Beloit, WI	249	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Jackson, MI	250	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Punta Gorda, FL	251	164	1.4%	0.0%	3.6%	0.0%	1.3%	0	
Bloomington, IN	252	714	2.8%	2.0%	0.0%	0.0%	1.4%	0	
Pueblo, CO	253	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Bend-Redmond, OR	256	2377	9.1%	0.0%	82.2%	7.8%	8.6%	0	
Niles-Benton Harbor, MI	259	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
State College, PA	262	741	3.4%	3.5%	0.0%	0.0%	3.9%	0	
Bangor, ME	263	0	0.0%	0.0%		0.0%	0.0%	0	
Decatur, AL	265	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Hanford-Corcoran, CA	266	252	1.3%	0.3%	7.7%	0.5%	1.0%	0	
Iowa City, IA	267	334	1.3%	0.0%	4.9%	6.5%	0.3%	0	
Rocky Mount, NC	268	0	0.0%		0.0%	0.0%	0.0%	0	
Monroe, MI	269	0	0.0%		0.0%	0.0%	0.0%	0	
Wichita Falls, TX	270	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	

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			All Races	Asian	Black	Latinx	White		
Burlington, NC	271	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Madera, CA	272	1098	6.9%	0.0%	0.0%	5.2%	13.3%	0	
Jefferson City, MO	273	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Grand Junction, CO	280	955	5.2%	7.9%		1.7%	6.4%	0	
Santa Fe, NM	283	1603	8.8%	0.0%	15.3%	9.0%	9.0%	0	
Johnstown, PA	284	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Midland, TX	288	305	1.6%	8.5%	0.0%	2.1%	1.3%	0	
Homosassa Springs, FL	289	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Auburn-Opelika, AL	290	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Coeur d'Alene, ID	292	1455	7.8%	6.8%	0.3%	11.8%	7.2%	0	
Springfield, OH	293	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
St. George, UT	294	1097	6.7%	0.0%		0.6%	7.5%	0	
Sebastian-Vero Beach, FL	295	30	0.3%		0.0%	0.9%	0.3%	0	
Odessa, TX	296	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Napa, CA	297	2585	15.1%	3.2%	45.3%	7.5%	19.3%	0	
Flagstaff, AZ	303	1717	10.0%	9.3%	5.1%	4.0%	13.7%	0	
Wausau, WI	305	0	0.0%	0.0%		0.0%	0.0%	0	
La Crosse-Onalaska, WI-MN	306	975	5.3%	49.3%	0.0%	0.0%	2.1%	0	
Lebanon, PA	307	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Pittsfield, MA	310	216	1.3%	0.0%	0.0%	0.0%	1.5%	0	
Jackson, TN	313	0	0.0%		0.0%	0.0%	0.0%	0	
Morgantown, WV	314	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Glens Falls, NY	315	0	0.0%		0.0%		0.0%	0	
St. Joseph, MO-KS	317	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Harrisonburg, VA	323	236	1.3%	0.0%	2.9%	0.1%	1.4%	0	

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			All Races	Asian	Black	Latinx	White		
Mansfield, OH	325	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Goldsboro, NC	327	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Anniston-Oxford-Jacksonville, AL	332	0	0.0%		0.0%	0.0%	0.0%	0	
Muncie, IN	334	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Sheboygan, WI	340	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Bismarck, ND	341	1112	6.2%	37.7%	0.0%	15.7%	3.6%	0	
Owensboro, KY	342	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Kankakee, IL	346	0	0.0%		0.0%	0.0%	0.0%	0	
San Angelo, TX	349	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Michigan City-La Porte, IN	350	0	0.0%		0.0%	0.0%	0.0%	0	
Wenatchee, WA	352	720	4.4%	0.0%		3.8%	5.2%	0	
Lawrence, KS	353	377	1.7%	0.0%	0.0%	0.0%	2.1%	0	
Decatur, IL	354	0	0.0%	0.0%	0.0%		0.0%	0	
Lewiston-Auburn, ME	358	338	1.9%	0.0%	0.0%	70.9%	1.0%	0	
Lima, OH	365	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Gadsden, AL	368	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	
Ithaca, NY	373	884	5.2%	5.2%	0.0%	0.2%	5.9%	0	
Ocean City, NJ	388	262	2.8%	0.0%	0.0%	0.0%	3.5%	0	
Parkersburg-Vienna, WV	402	0	0.0%		0.0%	0.0%	0.0%	0	

CBSA = Core-Based Statistical Area.

Sources: American Community Survey; American Time Use Survey; Zillow

Acknowledgments

The authors would like to thank the members of the Zillow Group Economic Research team who supported this work, especially Chris Glynn, Cory Hopkins, and Elizabeth Kimn.

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Exploring Unsheltered Homelessness, Migration, and Shelter Access in Kentucky

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Abstract

How do homeless service deserts in rural communities relate to people experiencing homelessness and migration to communities with services? This study explores this relationship using a mixed-methods case study of Kentucky and a rich dataset with county-level data. The data include information on unsheltered homelessness and typically underreported information like the number of people whose homelessness originated in each county. Combining that with data from the U.S. Department of Housing and Urban Development (HUD) on shelters and services shows that people experiencing homelessness migrate to counties with more shelters. Results show the importance of county-level data and data on originating homelessness for understanding homelessness and where to provide services to end it most effectively. Other states and homeless Continuums of Care, local jurisdictions for homeless services, where all service providers must coordinate to apply for and receive funding from HUD, can also provide public county-level data to clarify the geographic sources of homelessness and the relationship between services and migration.

Introduction

The view of homelessness as an urban problem often leaves other communities in need with few services available. Homelessness—living in a place not meant for human habitation like a car, outside, or an emergency shelter—is perceived as a purely urban issue. This misconception has left rural areas without legislative attention and needed aid, partly due to the lack of homeless visibility in rural communities (Basmajian and Rongerude, 2012; Trella and Hilton, 2014). The migration of people experiencing homelessness from regions without services to places with services may

exacerbate the discrepancy in resources and shape people's experience of homelessness (Shelton et al., 2018). Research on homelessness has yet to determine the extent of migration, primarily due to data limitations.

Each year the U.S. Department of Housing and Urban Development (HUD) conducts a Point-in-Time (PIT) count estimating homelessness in communities across the country. The PIT count is a snapshot of homelessness in communities on a single night. The location where homelessness originates is typically unknown as the PIT count only shows where people are currently homeless, not where they first became homeless. Thus, migration may not be apparent when analyzing the data as communities do not know how many people living as homeless in a community became homeless in that same community. To obtain a complete understanding of homelessness, migration, and shelter access, it is necessary to determine whether services relate to the number of people homeless in a community on the night of the count relative to the number originating as homeless. If migration exists, apportioning funds and services to areas where people leave may decrease the number of homeless in both the counties people migrate from and to, allowing people to stay in communities where they first experience housing instability (Cutuli and Herbers, 2014).

To address the problem of linking shelter access to the migration of people experiencing homelessness, this study examines how changes in the number of homeless shelters contribute to the variation between the number of homeless people originating in a county and the county's annual homeless PIT count as well as unsheltered homelessness. Most studies explore determinants of homelessness at the Continuum of Care level, local planning jurisdictions for homeless services funded through HUD, and where homelessness data are typically reported (Byrne et al., 2012; Kim and Sullivan, 2021; United States Government Accountability Office, 2020). All homeless service providers must coordinate services to end homelessness within their boundaries and jointly apply for federal funding annually. As such, Continuums of Care can also be viewed as a network, coordinating the multitude of stakeholders related to homelessness in addition to shelters, such as affordable housing developers, hospitals, law enforcement, and government agencies (Sullivan, Kim, and Lee, 2021). Continuums of Care define their boundaries following HUD guidelines and can be as small as a Community Development Block Grant area, downtown Atlanta for example, or a county like Seattle/King County in Washington state. They often encompass dozens of counties or even entire states, with almost every state containing a "Balance of State" Continuum of Care, which provides services for most rural areas within the state. Therefore, using Continuum of Care data combines areas with considerable economic, demographic, and service differences (Valero and Jang, 2016).

This study builds on the body of research on Continuums of Care, relying on county-level data from the K-Count, Kentucky's implementation of HUD's annual PIT count. To the authors' knowledge, states other than Kentucky do not publicly release county-level data on the unsheltered and the origination of homelessness, and no central database collects the data for all communities that do know that information. County-level data provide more information about local areas' contexts than the scarce amount of economic and demographic characteristics and shelters' locations supplied for Continuums of Care (Byrne et al., 2012). Furthermore, the K-Count provides access to an annual measurement of each county's unsheltered population and the

number of people originating as homeless, which are groups often omitted from studies due to the difficulty in obtaining a reliable count at the local level (Meehan, 2019). Kentucky annually collects these data to demonstrate the need for resources in each community and assess progress toward its Ten-Year Plan to End Homelessness (Kentucky Housing Corporation, 2009). Thus, using Kentucky's K-Count data provides a rich source of information on homelessness and allows researchers to understand variations in homelessness at the local level and study migration across county boundaries.

The analysis begins with a macro-level view, analyzing variation in shelters and homelessness across all Kentucky counties from 2013 through 2019 using regressions with two-way fixed effects. Although an increase in shelters could increase overall homelessness by offering more services, the findings show no change or decrease in unsheltered homelessness, likely through placing people into shelters. To examine the relationship between migration and service access, the analysis compares the number of people whose homelessness originates in a county to the number in the PIT count. Counties with more shelters have more people counted as homeless than originating as homeless in the county, suggesting migration, but changes in the number of shelters within a county over time do not relate to this discrepancy or originating homelessness. This does not rule out the possibility of migration, which may trend toward areas having relatively more shelter but not those with slight increases in shelters. Increasing shelters likely does not dramatically increase migration across counties because they would be unsheltered otherwise. These findings further the knowledge of what resources are valued and illuminate possible locations of rural service deserts and their effects on homelessness.

A case study supplements the statewide analysis by analyzing a cluster of contiguous South Central Kentucky counties: Allen, Barren, Butler, Edmonson, Logan, Simpson, and Warren. This cluster represents possible rural service deserts, where those entering homelessness must move to nearby counties to find services. Furthermore, Warren County has more services relative to its neighbors, leading to migration into the area (Somers, Moniruzzaman, and Rezansoff, 2015). To explore this cluster, the study examines service provider characteristics and news stories in conjunction with county-level characteristics obtained from the American Community Survey to provide a deeper picture of elements not offered by the HUD survey.

The findings contribute to existing knowledge of homelessness through studying originating homelessness, migration, and unsheltered homelessness at the county level. First, the results suggest migration from service deserts to perhaps be on a smaller scale than previously thought (Corinth, 2017). Second, by providing one of the first studies of unsheltered homelessness across dozens of rural and urban counties, the findings show counties with higher poverty rates and median income to have more unsheltered homelessness. Further, a county's increasing shelters likely relates to less unsheltered homelessness within the county. Third, the study demonstrates the importance of reporting homelessness at the county level when possible and including originating homelessness in HUD's PIT count surveys to understand the state of homelessness best. Last, as results are consistent with some migration across counties, housing policies focused on stopping homelessness, such as increasing affordable housing, would likely have a larger effect if implemented where homelessness originates, as demonstrated by the Warren cluster analysis.

Service Deserts

Service deserts are geographic areas that lack assistance for those experiencing homelessness or where services are difficult to access. Although services are typically emergency shelters, service deserts can also lack alternative support like permanent supportive housing and rapid rehousing services, which often provide physical shelter and other services including healthcare, food, or rent support. Service deserts force those requiring shelter to find alternative, informal sources of support within the community, such as doubling-up with friends or family, moving to areas with a shelter, or living unsheltered in a car, encampment, or other place not meant for habitation (Meehan, 2019; O'Flaherty, 2019). A large body of research looked at how food deserts lead to increased food insecurity along with increased rates of chronic illness, obesity, and depression (Han, Schwartz, and Elbel, 2020; Shannon, 2015). People in rural areas often live in food deserts and so turn to less-healthy foods (Bitler and Haider, 2010). Although studied less, it is reasonable for homeless service deserts to have similar adverse effects given that homelessness and housing insecurity also encompasses material insufficiency.

Service deserts are common in rural areas as housing insecurity is less concentrated than in urban areas. The lack of services causes people to leave their community, shaping their experience of homelessness. An excess of demand or limited shelter for a type of homelessness, such as households with children versus single men, also potentially leads to overcrowding of shelters, migration to communities with available shelters, or living unsheltered. There may be limits to how long someone can stay in the shelter, which limits services for people with extended periods of homelessness (Patton, 1989). The lack of available services leads some people to depend on other types of support like friends and family (Trella and Hilton, 2014). Studying how shelter availability relates to homelessness at the local level can help explain where service gaps likely exist and its effect on people's behavior with regard to finding services.

Data and Methods

Kentucky K-Count and Estimating Homelessness

Every January since 2005, HUD requires each community in the country, as a condition of receiving federal funding for homeless services, to conduct a PIT count of the number of people experiencing homelessness on a given night. Specifically, 24 Code of Federal Regulations (CFR) 91.205(c)(1) states that Continuums of Care plans must:

> "…include, for each category of homeless persons specified by HUD (including chronically homeless individuals and families, families with children, veterans and their families, and unaccompanied youth), the number of persons experiencing homelessness on a given night, the number of persons who experience homelessness each year, the number of persons who lose their housing and become homeless each year, the number of persons who exit homelessness each year, the number of days that persons experience homelessness, and other measures specified by HUD."

The counts are annually submitted when Continuums of Care apply for funding and provide a needs assessment and progress report related to ending homelessness for HUD and local communities (HUD, 2014). Volunteers go into shelters and canvas areas where people live unsheltered to estimate how many people are homeless that night and frequently ask these people about their homelessness experience. HUD reports PIT data at the Continuum of Care level. Continuums of Care are local jurisdictions for homeless services, where all service providers must coordinate to apply for and receive funding from HUD (Kim and Sullivan, 2021). Although some are small, such as downtown Chicago and Atlanta, others cover vast rural areas or entire states. Kentucky has three Continuums of Care as of 2021: Jefferson County (Louisville), Fayette County (Lexington), and the Balance of State, which encompasses all remaining counties.

The K-Count includes data at the county level and asks people experiencing homelessness where their homelessness originated. These procedures relate to two distinct advantages over the traditional PIT count. First, Kentucky publicly releases data at the county level for each of its 120 counties, instead of only the Continuum of Care level, providing more detail on homelessness in its rural areas, which can provide the entire state with more detailed information about homelessness and potential service deserts. The aggregate data is the same, but more detailed reporting allows greater exploration of variation in homelessness at the local level. Unlike the PIT count's public reports at the Continuum of Care level, the number of people experiencing unsheltered homelessness is reported at the county level. While researchers can infer sheltered homelessness at a local level through HUD's housing inventory count shelter data, unsheltered homelessness typically is only shown at the Continuum of Care level, masking variation.

Second, the K-Count asks people experiencing homelessness what Kentucky county (or out-of-state if not in Kentucky) their homelessness originated. This question allows the estimation of where people live if homeless during the PIT count and how much homelessness originates in a county. People experiencing homelessness often migrate across county lines to access formal or informal services (Meehan, 2019). Only using the PIT count could exaggerate or downplay the prevalence of homelessness. For example, if a county has significantly more people counted as homeless than originating as homeless, policies may shift focus from their county to elsewhere. If most people experiencing homelessness in a county did not originate in a county, creating affordable housing within the county is unlikely to stop homelessness from originating. Previous studies looking at migration were limited by only using Continuum of Care level analyses and not having data on originating homelessness (Corinth, 2017; Kim and Sullivan, 2021). The K-Count does not release data on originating homelessness by household type, such as with or without children, which limits exploring heterogeneity of migration. However, Kentucky and its K-Count data provide a rich data source to study unsheltered homelessness, originating homelessness, and migration of overall homelessness at the local level.

Empirical Approach

The study first analyzes the relationship between counties' changes in shelters and (1) the number of people experiencing unsheltered homelessness, (2) the number of people who originate as homeless in a county, and (3) the discrepancy between the number of people whose homelessness originated in the county and the number homeless in the county the night of the count. To deal

with that discrepancy, the K-Count asks homeless persons surveyed,[1] "In which [Kentucky] County or Other State were you living in when you became homeless this time?" This method provides an estimate of the number of people whose homelessness began in each county and who are still homeless the night of the count. The difference is calculated by subtracting the PIT count from the number originating. A positive discrepancy means a county has more people homeless than those that originated as homeless, implying migration from elsewhere.

To estimate the relationship between shelters and the migration of people experiencing homelessness, the analysis estimates regressions in which the explanatory variable is the number of shelters per capita in a county the previous year. Data on the number of shelters come from HUD's raw housing inventory count reports, including all homeless shelters in the country, whether they receive federal funding or not. The analysis uses the number of shelters instead of beds because it represents a more meaningful change in services at the local level than existing shelters, slightly increasing beds. This estimate can also represent a change in forms of homelessness, such as single men versus households with children, or sectors such as nonprofit versus government that the community provides services for or by (Valero and Jang, 2016). Shelters in this context typically take one of four forms: (1) emergency housing providing short-term shelter, (2) transitional housing providing shelter with additional services to help people achieve independent housing, (3) permanent supportive housing offering housing for an indefinite period and intended for those experiencing chronic homelessness or have disabilities, and (4) rapid rehousing, which limits the time people spend unhoused.

Shelters are lagged 1 year because homelessness counts occur in January, and it would take time for shelter changes to affect a county. Economic and demographic characteristics of counties from the Bureau of Labor Statistics and American Community Survey such as the unemployment rate, poverty rate, median income, and share of the population that is Black or African-American are also given a lag of 1 year. Homelessness and shelters are converted to per capita (per 10,000 county population) rates. Year-fixed effects are included in all models, controlling for anything common to all counties in a given year, such as Kentucky's statewide conditions or changes in the count methodology. In some specifications, county fixed effects are added, controlling for any time-invariant characteristics of each county; statistically, this takes the form of dummy variables for each county. County fixed effects remove many sources of potential bias that could relate to both shelters and homelessness. For example, if a county has a hostile attitude toward homelessness, it may decrease shelters, which thereby increases homelessness. County fixed effects adjust for this and similar sources of bias. Models without county fixed effects can reveal what happens when a county has more shelters than another. Models with county fixed effects reveal what happens when a county increases its number of shelters regardless of its stock. The inability to include variables that do not change over the period as they are absorbed by the fixed effects, such as rurality, is one limitation of county fixed effects. The sample is all Kentucky counties from 2013-19. Exhibit 1 presents summary statistics for variables of interest.

[1] Specific survey questions are available through the Kentucky Housing Corporation at the following link: https://www.kyhousing.org/Programs/Homeless-Programs/Pages/K-Count.aspx

Exhibit 1

Summary Statistics

	Mean	Standard Deviation	Minimum	Maximum
Discrepancy (#)	4.86	19.36	-57	146
Homeless Originating (per 10,000 population)	3.63	5.35	0	52.28
Unsheltered Homeless (per 10,000 population)	1.99	4.59	0	39.51
Sheltered homeless (per 10,000 population)	2.72	6.27	0	46.75
Shelters (per 10,000 population)	0.42	0.77	0	5.69
Unemployment Rate (%)	6.58	2.43	3.00	19.60
Poverty Rate (%)	20.68	7.48	4.90	47.00
Median Income ($1,000)	40.87	11.02	18.97	99.13
Share Black or African-American (%)	3.70	4.22	0	26.10

Notes: The exhibit shows summary statistics at the county level for 2013 through 2019. Data for originating homeless and discrepancies are not available for Jefferson and Fayette counties. The discrepancy is the number of people counted as homeless during the annual Point-in-Time count minus the number originating as homeless.

Sources: 2013-2019 Kentucky K-Count reports; 2013-2019 CoC Housing Inventory Count Reports; 2013-2019 Bureau of Labor Statistics Local Area Unemployment Statistics; 2013-2019 American Community Survey 1-Year Estimates

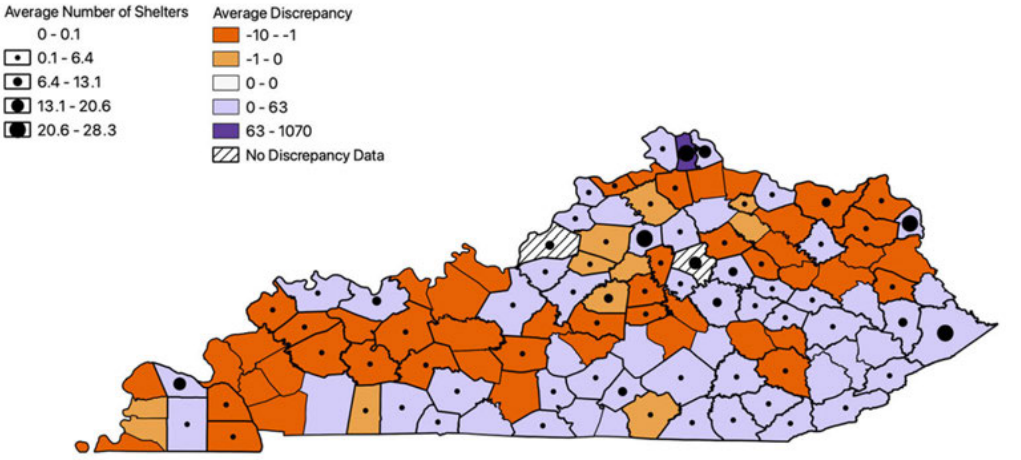
Results

Statewide Analysis

Exhibit 2 shows variation in the average number of shelters and the discrepancy across counties. Larger dots illustrate more shelters within the county relative to other counties. Orange shading represents fewer people counted as homeless during the PIT count than originating as homeless; purple illustrates the reverse. Considerable variation exists across counties, as many service deserts have no shelter and many others only have one or two, suggesting a lack of access to homeless services. Service deserts are most prominent in portions of southeastern Kentucky, typically considered Appalachia, which is known to have high unemployment rates and poverty and was recently struck by the opioid epidemic. Despite the likelihood of high rates of need, there is a lack of services for those experiencing homelessness. The lack of homeless services may be caused by having little need or few resources and funds to offer services (O'Flaherty, 2019). The majority of these counties have a positive discrepancy, meaning more people were counted as homeless during the count than originated, even though there are few services. Last, there is no clear urban-rural divide in discrepancy, although urban areas tend to have more shelters.

Exhibit 2

Average Number of Shelters and Discrepancy



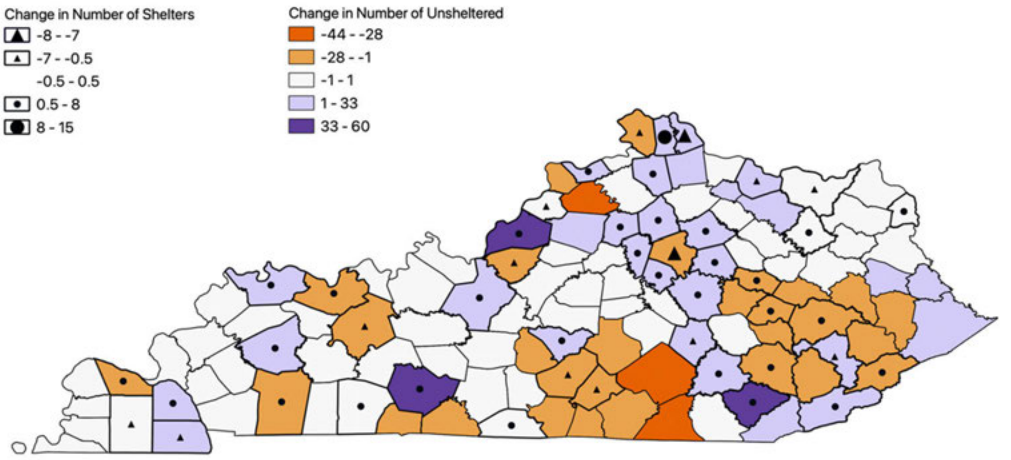
Notes: Map shows average levels of shelters and discrepancy by county from 2015 through 2020. Orange shading corresponds to a negative discrepancy, meaning fewer people were counted as homeless during the Point-in-Time count than originating as homeless, whereas purple is the reverse. Bigger dots mean more shelters in the county. Data are not available on originating homeless for Jefferson (Louisville) and Fayette (Lexington) counties for those counted as homeless within those counties.

Sources: 2015-2020 Kentucky K-Count reports; 2015-2020 CoC Housing Inventory Count Reports

Exhibit 3 shows changes in unsheltered homelessness and services from 2015 through 2020. Triangles or an orange field illustrate a decrease in shelters and unsheltered homelessness, respectively, while circles or a purple field represent an increase. The darker shades of orange and purple correspond to more drastic changes. Many counties did not change the number of shelters, unsheltered homeless persons, or both. Numerous rural counties had no change in homelessness, but many did have significant changes in unsheltered homelessness, suggesting conditions of housing instability fluctuate despite the rurality. There may be clusters of change in shelters and homelessness. Fayette County, in the northeastern part of the state, had a decrease in shelters and homelessness, and all counties neighboring it had an increase in both. While difficult to determine the causal direction, it suggests counties react to service availability and homelessness in nearby counties.

Exhibit 3

Changes in Kentucky Shelters and Unsheltered Homelessness



Notes: Map shows changes in homelessness and shelters by county from 2015 through 2020. Triangle markers correspond to a decrease in shelters. Circular markers correspond to an increase in shelters. Orange shading of counties corresponds with a decrease in unsheltered homelessness, whereas purple corresponds with an increase.

Sources: 2013-2019 Kentucky K-Count reports; 2013-2019 CoC Housing Inventory Count Reports

Exhibit 4 provides further insight into the relationship between shelters and homelessness with results from regressions without fixed effects, meaning results compare within counties over time and across counties. First, on average, one additional shelter per 10,000 population in a county relates with about 6 more people counted in the PIT count than whose homelessness originated in the county in column 1. The positive coefficient means more shelters positively relate with more people counted as homeless than originating, which is consistent with the theory of migration to services. Additionally, whereas shelters positively relate to unsheltered and sheltered homelessness in column 3 and column 4, the magnitude is much larger for sheltered homelessness. An additional shelter per capita relates to about 5 more sheltered people experiencing homelessness but only 0.5 unsheltered. The findings also reveal counties with a higher poverty rate and median income to have more unsheltered homelessness and, although research shows poverty to be a primary driver of homelessness, a higher median income in the county can increase the cost of living, particularly rent, and push people into homelessness (Byrne et al., 2012).

Exhibit 4

Relationship Between Shelters and Homelessness, *No County Fixed Effects*

	(1) Discrepancy	(2) Originating Homeless	(3) Unsheltered Homeless	(4) Sheltered Homeless
Shelters	6.22***	2.58***	0.54*	4.82***
	(1.16)	(0.47)	(0.21)	(0.48)
Unemployment Rate	-0.04	0.16	-0.05	-0.05
	(0.31)	(0.11)	(0.10)	(0.11)
Poverty Rate	0.15	0.01	0.22***	0.00
	(0.14)	(0.05)	(0.05)	(0.04)
Median Income	-0.06	-0.01	0.05*	0.05
	(0.11)	(0.02)	(0.02)	(0.02)
Share Black	0.27	-0.00	-0.03	0.21***
	(0.19)	(0.03)	(0.03)	(0.05)
Year Fixed Effects?	Yes	Yes	Yes	Yes
County Fixed Effects?	No	No	No	No

** p<0.05; ** p<0.01; *** p<0.001.*

Notes: Results are at the county level from 2013 through 2019. Robust standard errors are shown in parentheses. All explanatory variables are lagged 1 year. Population is also included as a control variable for column 1.

Sources: 2013-2019 Kentucky K-Count reports; 2013-2019 CoC Housing Inventory Count Reports; 2013-2019 Bureau of Labor Statistics Local Area Unemployment Statistics; 2013-2019 American Community Survey 1-Year Estimates

Exhibit 5 tells a slightly different story when looking at changes within counties over time by controlling for time-invariant county characteristics. Unlike exhibit 4, shelters do not statistically relate to the discrepancy, originating homelessness, and unsheltered homelessness. Discrepancy and originating homelessness are also much closer to zero, so a county increasing its number of shelters likely has little to do with discrepancy or how many people originate as homeless. This lack of an increase could be caused by minor changes not having a dramatic effect or the existing stock being more meaningful. The result for originating homelessness is consistent with previous studies finding shelter access likely does not drive people to become homeless, commonly referred to as "moral hazard" (O'Flaherty, 2019).

Although statistically insignificant at the 5-percent level, shelters now have a large, negative relationship with unsheltered homelessness on average; this relationship was positive in exhibit 4. Shelters still have a positive relationship with sheltered homelessness and, when considering that and the first three columns of exhibit 5, they indicate that increasing shelters would likely mean more people in shelters. Some migration can still occur given the positive discrepancy and larger increase in sheltered homelessness than the decrease in unsheltered, but the effect is likely much smaller than exhibit 4 initially suggests. While no control variables significantly related to any outcomes, this likely results from a lack of variation within counties for the study's timespan.

Exhibit 5

Relationship Between Shelters and Homelessness, *With County Fixed Effects*

	(1) Discrepancy	(2) Originating Homeless	(3) Unsheltered Homeless	(4) Sheltered Homeless
Shelters	1.50	0.23	-1.81	3.98**
	(1.54)	(0.60)	(0.99)	(1.35)
Unemployment Rate	0.23	0.16	0.03	-0.05
	(0.71)	(0.31)	(0.34)	(0.19)
Poverty Rate	0.13	-0.18	0.00	-0.09
	(0.33)	(0.12)	(0.13)	(0.08)
Median Income	0.19	0.08	-0.12	0.03
	(0.22)	(0.08)	(0.07)	(0.05)
Share Black	-0.99	0.44	-0.33	-0.08
	(1.10)	(0.43)	(0.45)	(0.26)
Year Fixed Effects?	Yes	Yes	Yes	Yes
County Fixed Effects?	Yes	Yes	Yes	Yes

** p <0.05; ** p<0.01; *** p<0.001.*

Notes: Results are at the county level from 2013 through 2019. Robust standard errors are shown in parentheses. All explanatory variables are lagged 1 year. Population is also included as a control variable for column 1.

Sources: 2013-2019 Kentucky K-Count reports; 2013-2019 CoC Housing Inventory Count Reports; 2013-2019 Bureau of Labor Statistics Local Area Unemployment Statistics; 2013-2019 American Community Survey 1-Year Estimates

The analysis also re-estimates models with 2-year lags of explanatory variables to test the sensitivity of a longer term. Exhibit 6, panel A, does not include county fixed effects; panel B does. Panel A is similar in statistical significance and magnitude. In panel B, unsheltered homelessness is statistically significant. In contrast, sheltered homelessness is not, but the magnitudes are similar to exhibit 5, which provides additional evidence that an increase in shelters relates to less unsheltered homelessness and more sheltered homelessness in a county. On the other hand, the coefficient for the discrepancy is now closer to zero (0.23), which is likely driven by originating homelessness's coefficient now being negative (-0.76). Counties with more shelters have higher discrepancy rates and rates of originating homelessness, but an increase in shelters likely does not relate to changes in either.

Exhibit 6

Relationship Between Shelters and Homelessness, *2 Year Lags*

	(1) Discrepancy	(2) Originating Homeless	(3) Unsheltered Homeless	(4) Sheltered Homeless
Panel A. No County Fixed Effects				
Shelters	6.12***	2.19***	0.65**	4.60***
	(1.37)	(0.46)	(0.23)	(0.58)
Year Fixed Effects?	Yes	Yes	Yes	Yes
County Fixed Effects?	No	No	No	No
Panel B. County Fixed Effects				
Shelters	0.23	-0.76	-1.72*	3.36
	(3.93)	(0.42)	(0.79)	(1.78)
Year Fixed Effects?	Yes	Yes	Yes	Yes
County Fixed Effects?	Yes	Yes	Yes	Yes

**p<0.05; **p<0.01; ***p<0.001*

Notes: Results are at the county level from 2013 through 2019. Robust standard errors are shown in parentheses. All explanatory variables are lagged 2 years. Population is also included as a control variable for column 1. Data on homelessness come from the annual K-Count reports.

Sources: 2013-2019 Kentucky K-Count reports; 2013-2019 CoC Housing Inventory Count Reports; 2013-2019 Bureau of Labor Statistics Local Area Unemployment Statistics; 2013-2019 American Community Survey 1-Year Estimates

Warren Cluster Analysis

In addition to the analysis of Kentucky counties, the study conducted a case study of a smaller geographic area: a contiguous cluster containing Allen, Barren, Butler, Edmonson, Logan, Simpson, and Warren counties. Warren County has the largest city in the cluster, Bowling Green, with about 67,000 people in 2019. Focusing on a cluster of counties furthers the analysis by assessing factors that were not measured or were masked in the statewide analysis, which looked at average relationships. Specifically, the analysis investigated the availability of formal and informal services and the communities' perceptions of homelessness. Moreover, the analysis of the cluster offers insight into the importance of identifying migration patterns by depicting a scenario where the increase in a county's number of shelters coincides with an influx of homeless from neighboring counties. Exhibit 7 shows the average number of shelters, total, originating, and unsheltered homelessness, discrepancy, and population in each county. Warren County had twice the number of shelters than the other six counties combined. It also had about four times as many people counted as homeless in the Point-in-Time count despite its population being similar to the other counties combined. However, the number of people originating as homeless was much lower, leading to a high discrepancy of 41 more people counted in the PIT count than originated as homeless.

Exhibit 7

Average Shelters and Homelessness in Warren Cluster Counties

County	Shelters	PIT Count Homeless	Originating Homeless	Unsheltered Homeless	Discrepancy	Population
Allen	0.1	3.4	3.6	1.3	0.3	20,724
Barren	0.1	2.8	13.1	0.3	-10.0	43,654
Butler	0.1	2.0	5.7	1.9	-3.4	12,885
Edmonson	0.0	0.0	1.0	0.0	-1	12,099
Logan	2.5	10.0	8.3	0.0	1.6	26,907
Simpson	0.1	11.6	9.6	8.9	2.7	18,097
Warren	6.8	122.8	76.1	23.8	40.6	125,346

PIT = Point-in-Time.

Notes: The exhibit shows an average of variables for each county in the Warren cluster for the years 2013 through 2020. All values are rounded to the nearest tenth. Data on homelessness come from the annual K-Count reports.

Sources: 2013-2020 Kentucky K-Count reports; 2013-2020 CoC Housing Inventory Count Reports; 2013-2019 American Community Survey 1-Year Estimates

Formal Service Availability

Analyzing formal services in the Warren Cluster exemplifies how service deserts shape the experience of homelessness and reveal migration across counties to access services. The analysis bases the amount of services available to each county on the Kentucky Housing Corporation Community Resource Guide provided on the Kentucky Housing Corporation website coupled with the county-specific service locations obtained from the Community Action of Southern Kentucky. This organization encompasses all the counties in this cluster.[2] From the list of service providers, it was determined that, although all counties had services located both in the county and in surrounding areas, Warren County had the most providers serving the county at 21 and service providers located in the county at 18. Allen, Simpson, and Edmonson counties only had eight service providers servicing each county, with three located in each county. Warren County also has unique services not present in any of the neighboring counties. For instance, people experiencing homelessness can obtain medical services through Street Medicine, a program that offers medical aid to homeless people three times a week in Bowling Green (Eggers, 2019). Street Medicine services range from tending to wounds to education on securing medication. However, Street Medicine programs are not common in small cities, so those seeking these services need to travel to Bowling Green.

In addition to having the largest number of service providers, Warren County has the most positive discrepancy with an average discrepancy of 40, meaning 40 more homeless people were counted in the PIT counts than originating within the county. Meanwhile, neighboring counties had far fewer services and typically had a negative discrepancy. This is especially clear in the instance of Barren County. Despite having the second-highest number of service providers total at 11, it had the most negative discrepancy in the cluster, and 10 fewer people counted as homeless in the PIT count than originating. This supports the statewide findings that more services relate to a more positive discrepancy, with those migrating most likely coming from nearby service deserts.

[2] https://www.kyhousing.org/Programs/Pages/Kentuckians-In-Need.aspx

Coordinated Informal Services and Community Care

Along with formal services, Warren County has extensive informal services and community care. Informal services refer to coordinated actions in a community independent from organizations, such as nonprofits; community care includes individual actions, like giving food to a homeless person. Unlike shelters, informal services and community care consist of aid not provided through members of the Continuum of Care or government grants. Informal services provided by community members increase the amount of aid available in an area and consequently influence the experience of homelessness. To detail the extent of these services, local news articles about homelessness in the cluster were gathered through a Google search of key phrases like "Barren River Area homeless" and "Southern Kentucky homeless opinion." The search was expanded by combining each county's name with terms like "homeless," "homeless news," "homeless clearing," "homeless opinion," and "homeless policies" to get a sense of the stigma and opinion in each county.

Of the articles resulting from the search, all informal services were in Warren County. Many informal services stemmed from citizens realizing the extent of homelessness present in their community and the gaps in services provided. The resulting informal services found reports ranging from the weekly serving of home-cooked meals to the collection and distribution of clothing, blankets, and hygiene products (Brooks, 2021; Fox News, 2011; Harvey, 2017).

The annual memorial service held in Bowling Green to honor people who died in the community while homeless further illustrates that people in the Warren County community care about the homelessness issue (Mason, 2015). Bowling Green does have a policy against "aggressive panhandling," but it is rarely enforced, and the police department even provides permits for legal panhandling (McCauley, 2019). Many in the community actively speak out against those blaming homelessness for the harassment of citizens by panhandlers by advocating for compassion toward those in need (Bowling Green Daily News, 2015; Line, 2015; Minor, 2015; Weaver, 2015). These cases illustrate the community's care for those experiencing homelessness, a characteristic that can influence local policies and government action (Fenley, 2020). For example, many cities often clear homeless encampments when citizens complain (Cohen, Yetvin, and Khadduri, 2019; Herring, 2014; National Law Center on Homelessness and Poverty, 2014). Stronger community care may decrease instances of these anti-homelessness policies and acts. Although some in Warren County still hold a stigma against those experiencing homelessness (Bowling Green Daily News, 2015; McCauley, 2019; Reecer, 2021), the county overall seems to have a generous attitude toward those experiencing homelessness. This level of care in Warren County could lead to an increase in the discrepancy between the number of homeless counted versus originating, as those experiencing homelessness are leaving counties with few resources for a chance to obtain needed aid without consequences such as judgment due to prevalent stigma, arrest for panhandling, and forcible relocation through the shutting down of tent cities (O'Flaherty, 2019).

Effect of Migration

The analysis of this cluster provides a deeper understanding of why homeless people migrate and gives further insight into its importance for policymaking and service provision. Due to the lack of shelter change in multiple counties within the cluster, the analysis can identify fluctuations in

homelessness, mainly unsheltered, that are not a result of the supply of aid in a county. By focusing on the unsheltered population, it can also be determined if increasing shelters will be sufficient for the need present.

An increase in shelters could relate to a decrease in unsheltered homelessness due to the rise in available beds, which was on average found to be the case across Kentucky, but this was not the case for Warren County. Between 2015 and 2020, Warren County gained three shelters, and its unsheltered population over this period grew by 40 people, from 11 to 51. Even without increasing the unsheltered population in neighboring Logan County, which gained a shelter, the theorized decrease did not occur. On the other hand, the other five counties, which did not change their number of shelters, had no change or a decline in unsheltered homelessness. This decline, paired with Warren County's increase in unsheltered homelessness, may indicate migration from these areas into Warren County. By specifically looking at the unsheltered population, the study shows that an increase in shelters and the supply of services may not match the resulting increased demand for services by homeless people who cannot obtain these services in neighboring counties.

This excess demand can cause a rise in the PIT count used to inform local governments, service providers, and HUD on the extent of need in an area and the efficacy of current programs, which influences federal funding through HUD (California Homeless Coordinating and Financing Council, n.d.; Kentucky Housing Corporation, n.d.; SAMSA, 2020; HUD, 2014). Service providers and officials may interpret the growth in the PIT count as a community in more need and consequently create more services, despite the growth resulting partly from the migration of many people experiencing homelessness from service deserts (SAMSA, 2020). If the previous trend persists, the increase in services could result in more migration from neighboring counties, continuing the cycle of increasing services and higher visibility of homelessness. This feedback loop demonstrates the importance of exploring other possible recipients for services and funding. For example, if aid targets counties where many homeless people originate, there may be a decrease in the homeless population of the county where many homeless originate. A decrease in the homeless population of the county where people migrate to is also likely. Although the effect of targeting aid to counties where homelessness originates is not known (Somers, Moniruzzaman, and Rezansoff, 2015), further exploration on the topic may reveal more beneficial targets for aid provision.

Conclusion

This study presents evidence on the relationship between the number of homeless shelters in a county and unsheltered and originating homelessness using county-level data provided through Kentucky's K-Count, which asks homeless persons surveyed where they were living when they became homeless. Finding that counties with more shelters have more people counted as homeless during HUD's PIT count than originated in the county highlights the importance of considering service deserts and migration when providing services to people experiencing homelessness. The analysis further highlights this point by demonstrating that an increase in shelters within a county relates to more sheltered homelessness and a likely decrease in unsheltered homelessness. This suggests shelters take in people who would have been unsheltered

otherwise. The study also shows that an increase in shelters does not relate to the number of people originating as homeless in a county.

The first policy implication relates to improved data collection and reporting on homelessness for HUD's PIT count. First, all but two of Kentucky's counties are in the same Continuum of Care. Although this may provide coordination across service providers, it limits inferences that can be drawn when data are reported at the Continuum of Care level as counties vary significantly in their services and conditions of homelessness. This is particularly the case for unsheltered homelessness, as it may hide specific service deserts. Second, asking where a person's homelessness originated can reveal migration patterns and where the problem begins. Shelters help people already homeless, but many programs like the low-income housing tax credit and housing vouchers attempt to stop homelessness from occurring in the first place (Kim and Sullivan, 2021). Programs such as these are likely to have more impact in communities where homelessness originates instead of where homeless people live on a given night. Taken together, HUD and Continuums of Care disaggregating data for research use and publishing data on originating homelessness can help service providers and researchers better design solutions to homelessness.

A second policy implication is that service providers and policymakers must consider how shelter access shapes the experience of homelessness and how service deserts will lead to migration across counties or living unsheltered. This implication is particularly demonstrated by the qualitative analysis of the Warren County cluster that showed people experiencing homelessness frequently move to nearby areas to access both formal and informal services. The migration and lack of services in counties from which people move creates excess demand in counties that increased services do not fulfill. Instead, service providers, particularly through Continuums of Care, should further eliminate service deserts within their boundaries, which may reduce homelessness across a wide area.

Despite the contributions of this study, several limitations exist. First, the analysis cannot observe migration explicitly. To do this, additional data such as a dyad between each county and the movement of homeless people would be necessary. However, the analysis still observes when people migrated to a county, although it is not known from which county they came. Second, a limitation of the Warren County case study lies in the diversity of news articles, with most of the articles published through Bowling Green Daily News. This may account for why all articles pertained to the informal aid provided in Warren County. The lack of news coverage in the surrounding counties may be due to the size of their cities compared with Bowling Green, the third-largest city in Kentucky. Without county-specific articles, the analysis is not able to determine the sentiment of the communities on homelessness. Last, states seeking to follow in the steps of the K-Count by including data on originating homelessness would benefit from also disaggregating it by household type to see more variation. It would be beneficial to explore this further to determine the role stigma plays in the migration of those experiencing homelessness.

Acknowledgments

The authors would like to thank Saerim Kim and Hunter McCormick for their valuable feedback on an earlier draft of the manuscript, as well as the journal's editors and reviewers.

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Connecting Housing, Health, and Social Supports for People Leaving Treatment: Housing Policy Lessons from Australia

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Abstract

This article presents housing policy and practice recommendations for enhancing the coordination of housing, health, and social care supports for individuals leaving institutional settings. Our recommendations are derived from empirical research conducted in Australia's two most populous states (Victoria and New South Wales) between October 2019 and March 2021 among people leaving residential treatment for mental health and/or alcohol and other drug (AOD) use issues. The period immediately following discharge from these settings is known to involve significant risk of housing insecurity, particularly for vulnerable individuals with complex health and social care needs. In conducting this research, our goals were to identify models of best practice in discharge and transition planning, and to propose strategies for enhancing coordination between residential treatment providers and key social and housing support services to mitigate the risk of homelessness for individuals leaving these settings. This article presents key research findings and recommendations for improving service coordination and transition planning across diverse institutional settings.

Introduction

The period immediately following discharge from residential treatment services for mental health and/or alcohol and other drug (AOD) use problems involves significant risk of housing insecurity for vulnerable individuals with complex health and social care needs (see Brackertz et al., 2020; Duff et al., 2013; Manning et al., 2017; Ritter et al., 2014). This article presents housing policy and practice recommendations to enhance the coordination of housing, health, and social care supports for individuals leaving these settings. Our recommendations are derived from empirical research conducted in Australia's two most populous states (Victoria and New South Wales) between October 2019 and March 2021 among people leaving residential treatment for mental health and/or AOD use issues. Our goals are to identify models of best practice in discharge and transition planning and to propose strategies for enhancing coordination between residential treatment providers and housing and social support services to mitigate the risk of homelessness for individuals leaving these settings.

Leaving Treatment: Housing Risks and Responses

In Australia, the primary sources of homelessness support are specialist homelessness services (SHS), which are agencies funded to deliver a range of accommodation related services and/or personal services to individuals who are homeless, or at risk of homelessness. Data from these services show that a substantial proportion of people who access these services in Australia have mental health or AOD use problems and housing insecurity. Of the 241,113 people who accessed SHS in 2017–18, one-third (81,000) reported a concurrent mental health issue, while the number of clients with a mental health issue increased by around 8 percent over the previous 5 years (AIHW, 2019c). One in 10 SHS clients were identified as having AOD use problems in 2018–19, with 55 percent of this group known to be homeless at the point of presentation to services

(AIHW, 2019c). In response to these trends, Australia's National Housing and Homelessness Agreement (2018–23) identifies individuals exiting institutional settings as a priority cohort and outlines the need for improved early intervention and prevention efforts, including more evidence-based service development.

Also relevant to the present study are the growing numbers of Australians accessing mental health care and/or AOD treatment services each year. In 2018–19, around 137,000 Australians accessed AOD treatment services, involving around 220,000 closed treatment episodes, with an average of 1.6 episodes per client (AIHW, 2019a). Of these treatment episodes, 65 percent involved non-residential treatment, 15 percent were delivered via outreach services (away from main service location), and 15 percent were delivered through residential programs. Around 260,250 individuals underwent a mental health-related hospital stay for one or more nights in 2017–18, with 63.6 percent of these admissions involving specialized psychiatric care (AIHW, 2019b). Approximately 36.3 percent of overnight stays involving specialized psychiatric care were involuntary admissions. Evidence indicates that treatment outcomes across these sectors are mixed, with more than three-quarters of Australians who exit treatment in either of the mental health and/or AOD treatment sectors returning to treatment at least once in their lifetime (Kelly et al., 2016; Nathan et al., 2016; Ritter et al., 2014).

Return to treatment is especially common among individuals with co-occurring mental health and AOD related problems (Manning et al., 2017), while adolescents and young adults with mental health or AOD use problems have similarly mixed outcomes (Ritter et al., 2014). Housing insecurity and weak social supports are key risk factors for repeated service contacts for individuals with a history of AOD related problems (Lubman et al., 2016), with similar reports for individuals with a history of in-patient mental health treatment (Brackertz et al., 2020). These risks are compounded with each subsequent episode of treatment, with the associated disruption to housing creating challenges for individuals attempting to maintain stable housing after a period of treatment. International research evidence, including program evaluations, indicate that comprehensive transition planning, along with careful coordination between health and social services, are central to successful reintegration into stable housing for individuals leaving residential treatment for AOD and/or mental health problems (Aubry, et al., 2016; Holmes et al., 2017; HUD 2007). Coordinated transition planning may reduce the subsequent incidence of service contact for individuals with a mental health diagnosis (Brackertz et al., 2020; Xiao et al., 2019). Reports also confirm the role of discharge planning in reducing subsequent treatment presentations for individuals leaving AOD treatment (Ritter et al., 2014). There is strong evidence that effective transition support has a host of additional health and social benefits, including reduced involvement with the criminal justice system (Holmes et al., 2017), improved primary health outcomes (AIHW, 2019a), and stronger self-reported experiences of social inclusion (Duff et al., 2013).

The present study responds to recurrent concerns in housing policy debates regarding the most effective forms of housing support for individuals leaving residential treatment settings (see Brackertz et al., 2020). Little is known about the most effective models of housing support and assistance, including what services are needed alongside these supports. It is also unclear how

allied social supports are coordinated with housing assistance and how these support services may be most effectively integrated into supported accommodation programs. While support from informal caregivers is known to be critical to the maintenance of stable housing for vulnerable individuals (Duff, et al., 2013), there is little guidance on how these informal supports may be integrated into formal support efforts. These debates highlight the need for fresh insights into the most effective ways of customizing "post-exit" care planning for individuals leaving diverse residential treatment settings to address their housing needs. Effective tailoring of housing support is currently limited by the lack of data on pathways into and out of residential settings, the role of risk and protective factors, and the most effective sequencing and combination of housing supports over time.

Research Approach, Aims and Methods

This study addressed four research questions:

1. What models of best practice may be derived from the available literature to enhance transition planning and service integration for individuals leaving treatment?
2. How does residential treatment affect individual housing careers over time?
3. How can post-exit support packages be tailored and delivered to individuals leaving residential treatment who are most at risk of homelessness?
4. How effective is existing service integration between housing and other sectors in transition planning and post-exit support for individuals leaving residential treatment? What opportunities exist for service improvement and enhanced coordination?

A mixed methods study design was best suited to address these questions, involving analysis of an administrative dataset on patient outcomes and original qualitative research conducted in New South Wales and Victoria with service providers and people with lived experience of residential treatment. All research received institutional ethics approvals at the Royal Melbourne Institute of Technology (RMIT) University.

Data Sources

Mental Health Treatment Outcomes Cohort

The first study phase involved analysis of linked administrative data maintained by the Victorian Department of Health and Human Service (DHHS). Access to this dataset enabled analysis at person-level of service utilization patterns of a cohort of individuals across health and mental health services, family and justice services, and housing services (the latter from the Specialist Homeless Information Platform). The study cohort comprises 5,174 individuals aged 15–24 who were admitted to the hospital in Victoria for mental health issues and who were discharged from the hospital some time in 2013–14. The decision to focus on a population aged 15–24 years at the time of their service contact was made because, in nearly three-quarters of cases, the onset of mental health problems in Australia occurs before the age of 24 (AIHW, 2019a), suggesting

that early intervention and improvements in service accessibility for this cohort should yield the greatest individual, social, and economic benefits. Our analysis of this cohort draws on administrative data from 13 Victorian Government databases, using a unique identifier created by the Centre for Victorian Data Linkage (CVDL) within the DHHS (see Duff et al., 2021: 23–24 for more details on method and approach). These data shed important new light on pathways into and out of treatment and on how service contacts mediate housing outcomes over time. By analyzing service utilization patterns following treatment exits, we have also been able to identify risk factors for housing instability for different cohorts and then consider policy recommendations to reduce these risks.

Service Providers' Views and Experiences

Our qualitative research proceeded in two phases. The first involved interviews and focus groups with a sample of service providers in Victoria and New South Wales. Interview and focus group questions for service providers examined pathways into and out of support services, with an emphasis on housing outcomes, service availability and gaps, and on responses to individuals with complex health and social needs. During this phase we conducted 17 interviews (10 in Victoria and 7 in New South Wales) and initiated four focus groups (one in Victoria and three in New South Wales) with service providers, involving 35 participants across the two study sites. Interviews were conducted in-person or over the phone, and all focus groups were conducted in-person. Interviews and focus group discussions highlighted pathways into and out of residential settings, the types of supports available, and the significant structural barriers encountered by service providers in the provision of effective housing support. These sessions also provided an opportunity to establish relationships to help facilitate recruitment for the second phase interviews with service users.

Views and Experiences of People with Lived Experience of Residential Treatment

The second phase of qualitative data collection involved interviews with a sample of individuals with lived experience of residential treatment in Victoria or New South Wales. The second phase was significantly disrupted by COVID-19-related restrictions on movement, particularly in Victoria. In consultation with the research team and key stakeholders who assisted with recruitment of service providers, it was decided to conduct the interviews with service users online or over the phone. Recruitment information was circulated via the communication channels of supporting agencies and through professional networks via social media. We also worked with advocacy organizations to recruit via lived experience advisory groups. COVID-19 lockdown restrictions meant we were unable to interview people with unstable housing, such as those in boarding houses and in supported residential services (SRS).

Guided by the models of best practice derived from the evidence review conducted earlier, interviews with service users explored ways of optimizing post-exit housing support, the availability and utility of informal social supports such as caregiver and extended social networks in maintaining stable housing, along with options for more effectively integrating formal and informal supports into transition planning and post-exit support arrangements. We conducted 25 interviews (15 in Victoria and 10 in New South Wales) with individuals who had experience of residential

treatment in order to generate first-person accounts of transition pathways and supports. There was significant diversity within the accounts of those with lived experience, with many people recounting extensive contacts with mental health, substance use treatment, and housing services. Some people spoke of experiences of homelessness, other housing difficulties, and the need for respite support to maintain their housing.

Analysis and Findings

Our linked data analysis confirms that service transitions have a significant impact on housing trajectories, particularly for younger individuals with complex health, housing, and social care needs. This relationship is complex in that frequency of service contact is obviously an indication of service demand and the complexity of individual's health care needs. Yet it is also the case that service contacts, particularly residential treatment (in mental health and/or AOD treatment settings), may disrupt housing situations. For example, entering residential care may disrupt formerly relatively stable housing arrangements, such as when individuals end a residential tenancy agreement before entering treatment. On the other hand, individuals may decide, perhaps as a result of treatment, that they wish to alter their housing post-treatment in favor of, for example, other accommodation in a different location.

We discovered a strong correlation between the volume and frequency of service contacts and periods of housing insecurity in the mental health treatment outcomes cohort. The younger the age at which first contact with health and/or social services occurs, the stronger the impacts on housing over time. Younger individuals with complex health, housing, and social care needs tended to experience significant disruptions to their housing trajectories post-care. We also found that young people with mental health issues use services at a much higher rate than the general population. For example, youth with mental health issues have more than seven times the rate of hospital admissions compared to all Victorians aged 15–24 years (140.5 admissions per 100 person year [PY] as compared to 18.6 admissions per 100 PYs); six times the rate of emergency department presentations (163.0 presentations per 100 PYs compared to 26.4 per 100 PYs); and are more likely to access AOD treatment (26.9 per 100 PYs as compared to 1.8 per 100 PYs). Similarly, 13.3 percent of young Victorians with at least one episode of hospitalization for a mental health concern accessed homelessness services between 2013–14, compared with 1.8 percent of all Victorians aged 15–24.

In the 30 days after leaving the hospital, 18 percent of people in the cohort were re-admitted into the hospital, with mental health the most common reason (9 percent). After 12 months, over one-half (55 percent) had been re-admitted to the hospital, with over one-quarter of these (29 percent) admitted for a mental health reason. Over the following 4 years, over three-quarters (78 percent) had been re-admitted to the hospital, with mental health issues being the most common reason for readmission (42 percent). A substantial minority of people, however, were readmitted for self-harm (34 percent) and/or substance use issues (28 percent). First Nations Australians accessed services at a higher rate across almost all service use types (see Duff et al., 2021: 31–32). These results are important, because frequency of hospitalization is strongly linked in the data to later contact with Specialist Homelessness Services. Our qualitative data suggest that this is likely due to disruptions

to individual housing arrangements associated with periods of either voluntary or involuntary admissions to psychiatric care. This can happen, for example, when an individual enters the hospital from private rental accommodation, which is then placed at risk if an individual stays in the hospital for longer than anticipated and cannot maintain rental payments.

Homelessness is therefore an elevated risk for this group, because access to social housing in Australia is difficult. Waiting lists are very long because of a lack of housing supply (see Duff et al., 2021: 60–62). Young people, in particular, appear to be insufficiently profitable for Community Housing Providers to support, due to their issues of income insecurity and generally mixed employment histories. Income support is a particularly pressing need in this respect. Changes in assessment criteria for income support payments in recent years have resulted in many people who would previously have been eligible to receive a disability support pension (DSP) instead receiving the unemployment payment Newstart, which is of demonstrated insufficiency (see Davidson et al., 2020). Equally, our interviews suggest that public housing is unattractive for some young people because it locks them into a particular public housing tenancy within a particular location, when they prefer to be more geographically mobile.

A policy option that may mitigate the risk of homelessness for this group is enhanced housing assistance to sustain individual rental arrangements by subsidizing rent payments for the duration of an individual's hospitalization. Some of the service providers we spoke to indicated that there may likely be scope to draw on existing rental assistance mechanisms, or to access discretionary funding that is often available at the psychiatric ward level (for example, through brokerage funding available through Inpatient Unit Planning support funds) to support rental payments to reduce the risk of loss of tenancy and ensure that individuals can return to their existing housing. This will require the early identification of individuals in need of housing support, involving enhanced intake and admissions procedures to identify housing risk for individuals at intake and during a hospital stay. Individuals identified at risk of housing insecurity could then be referred to SHSs and other housing providers.

Findings from Interviews

Interview participants described inconsistent and sometimes ineffective discharge planning arrangements by mental health and/or AOD treatment providers across Victoria and New South Wales. Interviews indicate a significant gap between how care and service coordination is described in relevant policy documents and what is commonly experienced by individuals exiting residential treatment settings. We identified instances of effective practice in service delivery, but also many instances of poor transition planning. Central to all discussions of effective practice among both service providers and service users was the centrality of safe and secure housing for mental health and wellbeing. For individuals with experience of mental illness or distress, and/or significant histories of AOD-related problems, safe and secure housing was seen as an indispensable condition for recovery. Equally critical to recovery is effective coordination between different service sectors, although most service providers indicated that instances of effective service integration and coordination were highly variable and relationship-dependent at best. Other service providers made reference to the impact of housing and social care policy and practice reforms over the last decade, which have tended to involve the design and delivery of carefully targeted services with

strict eligibility criteria, often in carefully designated "catchment areas." As a result, increased service specialization, combined with growing geographical fragmentation, have become hallmarks of housing, health and social care service responses around Australia.

Discussing these changes, interview respondents noted how housing services in Victoria and New South Wales have become increasingly complex in recent years, with greater service specialization involving more targeted supports, typically calibrated to address the needs of increasingly diverse groups. As such, services have become more complex, more specialized, and more difficult to navigate for many, particularly more vulnerable individuals. Service providers noted the enduring impacts of service silos and the ongoing lack of coordination between services. More critically, some service providers questioned whether services were actually capable of delivering long term, coordinated support, as one respondent noted:

> *The thing we all need to remember is that our homelessness service system, with only a few limited exceptions, is only funded for a defined period of support. Really, it's mainly only short-term support, intended to resolve a temporary crisis in someone's life. So this idea that we can overcome, in some cases, decades of accumulated disadvantage that starts in early childhood, goes all the way through school, and then any experience at work people might have had. The idea that you can somehow manage or make up for those sorts of things through a 6-week intervention, or a period of crisis accommodation, is just farcical.*
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Making similar arguments about the inadequacies of existing housing support programs, most service users we interviewed described complex histories of insecure housing, with regular changes of accommodation and multiple points of contact with housing support and service providers in diverse geographical settings. The individuals we interviewed with experiences like this spoke of the grueling impact of the conditions of doubt, fear, insecurity, and vulnerability that tends to pervade all aspects of daily life for those experiencing housing insecurity, affecting physical and mental health, employment, friendships, and the ability to plan for the future. Housing and health go "hand-in-hand" as many interviewees put it. Discussing this point, one interviewee with lived experience of treatment settings noted how:

> *If I don't have safe housing or stable housing, then I can't be mentally well and I'm going to more than likely relapse again, and I don't want that. And that's also my main reason for not wanting to go back into a privately rented room or something like that is because every time that I've lived in a shared house, they're got people on drugs [and] I just can't be around that for my recovery. That's why, honestly, I want my own place, so I can just shut the door on all the drugs and no one's in my house that's using.*
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Alluding to the broader social and structural dimensions of these experiences, including housing market conditions, other interviewees emphasized how rising housing costs, tight private rental markets, and long waiting lists for social housing shape the housing pathways of vulnerable individuals on fixed incomes. The key point is that stable, affordable housing is increasingly

difficult to access across the country, particularly in metropolitan settings, significantly impacting the housing pathways of individuals exiting treatment settings.

Addressing these challenges, service provider interviews often emphasized how effective service coordination typically requires personal relationships, informal work-arounds, creative negotiation, and compromise. Finding ways to "work the system," to make what have become highly bureaucratized service systems work for clients, have become critical on-the-job skills for the coordination of effective health, housing, and social outcomes for disadvantaged clients. In talking about these systems, service users also remarked upon what they described as inconsistent and sometimes ineffective discharge planning arrangements. Ideally, discharge planning provides an opportunity for clinical and allied health professionals to liaise with community health and housing service providers to address an individual's housing needs in more systematic and effective ways. The design of appropriate housing supports for individuals leaving treatment was a strong focus of service provider interviews, whereas service users tended to point to shortcomings and inconsistencies in this support. Some service users noted how their decision to enroll in residential AOD treatment, or to seek an admission to psychiatric inpatient care, was partially motivated by the desire to find respite from housing situations that they regarded as unsafe or unhealthy. For others, for whom their housing may be secure (insofar as they had security of tenure), this did not necessarily make their housing safe or appropriate in terms of their health or recovery (living close by to other drug users). Service users often indicated how these nuances were overlooked in care planning discussions, where their existing housing was seen as "good enough" despite their misgivings about aspects of this housing (such as drug/alcohol use in the vicinity).

Discussion and Policy Implications

Our findings offer significant new insights into effective models of post-exit support and discharge planning for individuals leaving residential settings for mental health and/or AOD use problems. This research has enabled us to identify and analyze: key barriers to successful reintegration into stable housing; relevant risk and protective factors mediating pathways into stable housing; and the role of formal service supports and informal social and family supports in retaining housing. Overwhelmingly, our research confirms that appropriate, safe, and affordable housing is crucial to support individual's mental health and wellbeing, to facilitate community participation, and to sustain recovery (Kavanagh et al., 2016; Paquette and Pannella Winn, 2016; Thornicroft, Deb, and Henderson, 2016). Despite strong evidence of the health and social benefits of housing (Xiao, Gulcur, and Nakae, 2019), housing insecurity continues to be a problem for many individuals leaving mental health inpatient services and AOD treatment in Australia. In contexts of growing service fragmentation, discharge and transition planning arrangements are becoming more complex and uncertain across the housing, mental health, and AOD treatment sectors (see also Aubry, et al., 2016; Brackertz et al., 2020). Failure to adequately plan for and support safe transitions from residential treatment into secure housing can have significant consequences for individuals leaving care, with strong impacts on their housing, their health and wellbeing, and their economic and social participation in the community.

Furthermore, we found that housing, mental health, and AOD treatments sectors in both New South Wales and Victoria remain largely separate service systems with little formal integration. There is significant scope, therefore, to enhance the integration of housing, mental health, and/or AOD treatment services, along with other health and social supports as needed, through more systemic organizational and governance arrangements. Poor integration and a lack of coordination result in suboptimal outcomes, including higher rates of inpatient care, increased need for AOD treatment, and greater pressure on SHS and other services following discharge. Indeed, individuals entering and exiting mental health and/or AOD treatment typically have complex ongoing health and social care needs, requiring significant post-care coordination between housing, health, and social care providers.

With these housing needs in mind, our findings suggest grounds for enhancing the design of post-exit support packages to address the health and social care needs of individuals exiting institutional settings more effectively. Transition packages ought to be designed and delivered on the basis of what they enable individuals to do in their everyday lives following their exit from care. Transitional services and supports ought to be tailored to individual needs in relation to housing, employment, education, and financial needs and aspirations, as well as community integration and belonging, social inclusion, and hopes for the future (see also Duff et al., 2013). Furnishing the supports needed for a more "liveable life" (see Alam and Houston, 2020; Amin, 2014; Berlant, 2016) ought to be the focus of transition planning for individuals exiting mental health or AOD treatment settings, taking their formal and informal housing, health, and social care needs into account. Such a focus shifts the design of transition planning beyond the immediate goals of a specific organization to emphasize an individual's unique support needs in the coordination of services (see Batterham, 2019). Likewise, effective and safe transition planning depends on strong local relationships between diverse service providers, with a strong grounding in relations of trust and reciprocity, transparency, and accountability, where the client's needs are central to all service and transition planning.

Our research provides further endorsement of the housing first model—whereby long-term, permanent housing is provided without conditions—as a guide to enhance the integration of housing, health, and social care supports for individuals leaving residential treatment settings for mental health and/or AOD problems. Despite the influence of housing first models in Australian housing and social policy debates, housing readiness approaches have been more common (see Clarke, Parsell, and Vorsina, 2020). Housing readiness approaches provide supported housing arrangements according to a so-called staircase model based on assessments of an individual's capacity (or readiness) to maintain stable housing. In contrast, housing first emphasizes the provision of stable housing without conditions for individuals living with complex and persistent mental health and/or AOD use problems (see Tsemberis et al., 2004). In the latter approach, there are no behavioral or treatment prerequisites that must be met before an individual is provided with accommodation. Despite these differences, both approaches suggest that housing is an indispensable condition of effective post-exit care support for individuals leaving residential treatment settings.

Our linked data analysis indicates a strong correlation between the volume and frequency of service usage across mental health and AOD treatment settings and the risk of housing insecurity among service users. This finding is consistent with national and international research which has consistently found that frequency and volume of service usage, particularly for mental health, housing, and/or AOD services, strongly predicts housing insecurity over the life-course (see Duff et al., 2021 for a detailed review). Our analysis suggests the need for enhanced measures to identify high-volume service users and to more explicitly tailor housing and social support responses to their needs. This further suggests the need for site-specific policy development and service design efforts to facilitate the delivery of more effective transition planning supports for individuals leaving mental health and/or AOD treatment settings. In particular, we would recommend more effective integration of housing supports within the delivery of mental health care, particularly in inpatient psychiatric care, and in the delivery of community-based AOD treatment, particularly residential rehabilitation services. Interviews with service providers in each of these settings revealed significant discrepancies in the delivery of community-based mental health services, and considerable strain upon psychiatric services in hospital settings, particularly in Melbourne and Sydney's largest hospitals. We also identified significant gaps and problems in the integration of housing supports into mental health care, despite the obvious need for such coordination, particularly among more vulnerable cohorts. A similar picture emerges in our analysis of AOD treatment services in New South Wales and Victoria, with a mix of public and private care provision, and a great diversity of treatment models and pathways. Here too, the level of integration of housing supports into the delivery of treatment services is variable.

On the basis of analysis presented in this article, we identify the following key policy issues:

- Housing affordability, social housing shortages, and lack of supported housing remain key challenges for individuals experiencing mental health and/or AOD issues.
- Housing/homelessness, mental health, and AOD treatment remain separate systems across New South Wales and Victoria, with only partial systems coordination.
- Within these systems, there is significant unmet demand for housing support, as well as resource gaps and constraints on coordination between health and social supports.
- Housing supports ought to be integrated more effectively into discharge planning in psychiatric inpatient care for individuals at risk of (or experiencing) housing insecurity.
- There is scope to enhance the role of allied health staff and external community service providers in care coordination in psychiatric inpatient care to improve the integration of housing support for individuals at risk of (or experiencing) housing insecurity.
- Individuals exiting mental health and/or AOD treatment express strong preferences for greater choice and control over their housing transitions post-care.

Addressing these outstanding policy and service design challenges will require significant service reforms. It further suggests the need for service design reforms to drive enhanced housing service delivery in key points of interception within and across mental health and/or AOD

treatment services, and more specialized housing support services, where care coordination can be significantly improved. Focusing attention and effort at these points can improve health and housing outcomes for individuals and reduce costs over time. In particular, widespread emphasis across the mental health and AOD treatment sectors on bureaucratic and administrative processes over and above an individual's care needs must be reversed. All discharge planning must begin from the point of view of the individual in care, in keeping with, for example, person-centered approaches to care coordination and service delivery that are increasingly common across these sectors (see Duff et al., 2021). Of added importance is the need to ensure that mental health, AOD treatment, and specialized housing supports are formally integrated through service and system design innovations. At a practical level, this could include the introduction of housing risk assessment tools at admission and during stays in both psychiatric inpatient and residential AOD treatment settings. Improved screening and assessment protocols are a critical means of ensuring that individuals in need of housing support are identified in these settings and to inform discharge planning to provide for more effective after care and transition supports on exit. Peer workers and lived experience advisory groups in housing, mental health, and/or AOD treatment spaces are a key source of expertise that could be drawn on in the development of novel screening and assessment instruments and in discharge planning.

The formal integration of housing risk assessments into screening protocols in each sector would facilitate formal assessment of individuals' existing housing status, as well as their housing preferences upon discharge, along with their risk of housing insecurity. On this basis, specialized housing services could then be more formally integrated into discharge planning arrangements in both psychiatric inpatient care and residential AOD treatment services to reduce experiences of housing insecurity and/or homelessness for individuals on exit. Housing services representatives could then work more closely with clinical and allied health teams (particularly social workers) to enhance discharge and transition planning processes in psychiatric inpatient settings. Within residential AOD treatment settings, housing needs ought to be formally integrated into transition planning arrangements from the point of intake. Our findings further suggest that post-exit assertive case management is an effective means of supporting vulnerable individuals with complex care needs to access and maintain stable housing while also reducing costs in the longer term.

Conclusion

Our research makes a compelling case for more formal integration of specialist housing services into both inpatient psychiatric and AOD treatment settings in Australia, given the significant risks of housing insecurity that many individuals experience after leaving these settings, including experiences of homelessness. There are several instances of good practices to guide these service enhancements, such as innovative housing and social justice programs like Journeys to Social Inclusion and Green Light in Victoria and the Housing and Accommodation Support Initiative (HASI) in New South Wales (see Duff et al., 2021 for details). These programs, which combine housing and mental health/psychosocial support, indicate the benefits of the integration of housing, health, and social supports, demonstrating that long term stable housing can be sustained for individuals regardless of the complexity of their health, housing, and social support needs. In this respect, we already have clear models of effective care coordination and successful service integration

to guide the provision of stable housing for all Australians. The task is to scale up these endeavors to ensure that all Australians who need such supports receive it, regardless of circumstance. Equally critical is the need to increase funding for the provision of new social housing to guarantee access to affordable, safe, and secure housing for all Australians who require it.

Our research also has important implications for the organization of social care services and supports—for example, in terms of work design issues, leadership and governance approaches, role descriptions, and task allocations— across and between specialist housing services, mental health, and AOD treatment services in Australia. Successive waves of policy reform involving changes to funding arrangements, performance indicators, work design, and organizational structures across the broad community health and social care sectors have had enormous impacts on the everyday work of delivering care in specialist housing services, mental health, and AOD treatment in Victoria and New South Wales. In each jurisdiction, the housing services landscape is becoming more complex, more fragmented, more competitive, and more focused on delivering short term outcomes for vulnerable individuals. As a result, service pathways are becoming more complex with significant impacts on individual care trajectories within and across specialist housing services, mental health, and AOD treatment. Finding ways to assist vulnerable individuals to navigate these systems of care, perhaps via expanded support and way-finding roles for peer workers in each sector, are recommended. Above all else though, our findings confirm that access to secure housing must remain the foundation of efforts to enhance the coordination of health and social supports for vulnerable individuals across the health and social care sectors in Australia. After all, enhanced care coordination and improved service integration are not, on their own, solutions to the housing insecurities that many Australians experience. The only long-term solution is stable and secure housing.

Acknowledgments

The authors wish to acknowledge funding support from the Australian Housing and Urban Research Institute (AHURI) for the research reported in this paper (19/PRO/53210). The full project report may be accessed at https://www.ahuri.edu.au/research/final-reports/359.

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Graphic Detail

Geographic Information Systems (GIS) organize and clarify the patterns of human activities on the Earth's surface and their interaction with each other. GIS data, in the form of maps, can quickly and powerfully convey relationships to policymakers and the public. This department of Cityscape includes maps that convey important housing or community development policy issues or solutions. If you have made such a map and are willing to share it in a future issue of Cityscape, please contact alexander.m.din@hud.gov.

Mapping Equity and Exclusion in Neighborhood Associations in Bloomington, Indiana

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Abstract

Local governments often encourage neighborhood organizing efforts to support citizen participation and bridge a gap between public and private interests, yet the growth of neighborhoods in the United States also has had a long history of exclusion. A grassroots mapping initiative illustrates how private, voluntary neighborhood associations in Bloomington, Indiana, commonly exclude residents of multifamily housing. The visual evidence of those disparities creates important opportunities to pursue more equitable channels to engage residents in local decisionmaking.

Introduction

Neighborhood associations can provide a powerful voice for residents in communities throughout the United States, but what if neighborhood associations intentionally exclude nearby renters?

After realizing that his own neighborhood association in Bloomington, Indiana, deliberately excludes nearby multifamily properties, Mark Stosberg investigated how common such exclusionary practices were elsewhere in the city. Mapping those inequities made the invisible visible.

Neighborhood Associations and Local Governance

Neighborhood organizations in the United States have a history that stretches back to the late 19th century, but they came into full bloom in the 20th century. Many were "middle-class improvement and protective associations" that often established a substantial role in local governance (Silver, 1985: 164). In the past 50 years, the growth of neighborhood associations in the United States has been exponential (Ruef and Kwon, 2016).

Local governments often encourage neighborhood organizing efforts to boost citizen participation and local democracy and bridge a gap between public and private interests (Mathews, 2021; Meyer and Hyde, 2004). Homeowners are more likely to participate in neighborhood organizations than renters, however, creating an advantage in civic influence (McCabe, 2013).

Roots in Exclusion

The growth of neighborhoods in the United States has long been rooted in exclusion. Residential racial and socioeconomic segregation has frequently been codified by local zoning codes, enforced by social customs or coercions, and erected physically with gates, fences, and walls.

Even if overt housing discrimination is now more subdued, neighborhoods' generations of systemic social and racial inequities persist via rules, regulations, and implicit biases (Solomon, Maxwell, and Castro, 2019). In studies by Kyu-Nahm Jun and Juliet Musso, as well as Elinor Ostrom (as cited in Mathews, 2021), researchers found that socioeconomic inequalities in civic involvement are mirrored in local governance.

Neighborhood Associations in Bloomington, Indiana

Bloomington, Indiana, is a city of about 85,000 residents (U.S. Census, 2019a), including 43,260 students at Indiana University (Indiana University, n.d.). Nearly 65 percent of the population rent their homes. More than one-third of residents experience poverty, including 15 percent of children (U.S. Census, 2019b).

As in many communities, Bloomington's neighborhood associations seek to build social capital and serve as a channel of direct communication with local government, with support from agencies such as the city's Housing and Neighborhood Development (HAND) Department as well as the Council of Neighborhood Associations - Bloomington, also known as CONA (City of Bloomington, Indiana, 2021; CONA—Bloomington, 2020).

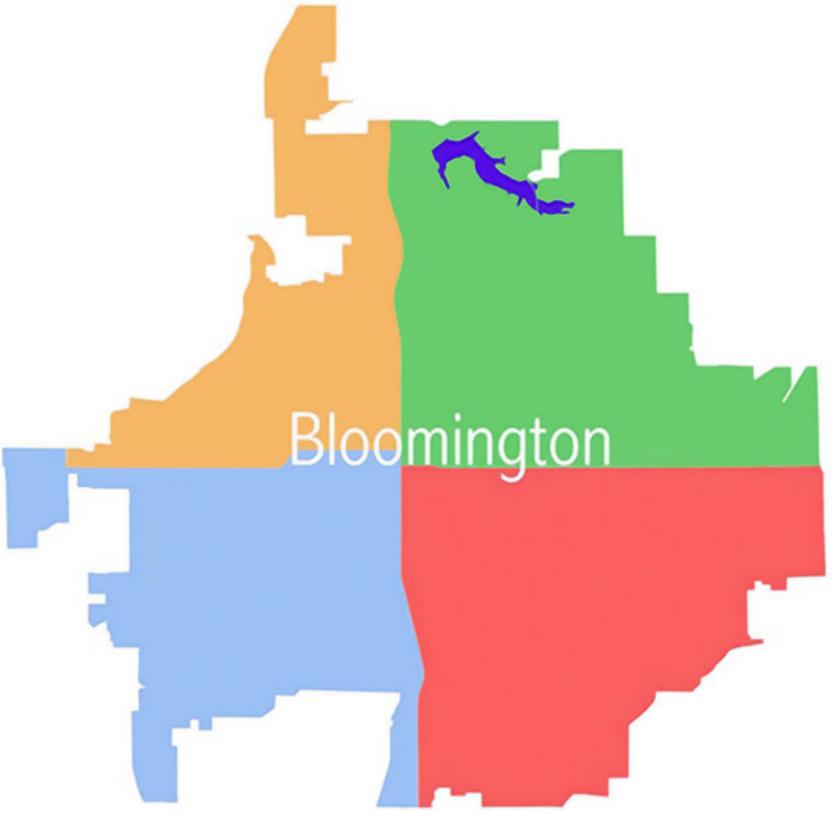
CONA is an independent, nonprofit volunteer organization that has regularly collaborated with the city over the past 30+ years. In the past decade, it has been particularly active in land use issues and revisions to the city's zoning code.

Mapping Exclusion

This CONA icon (exhibit 1) is composed of the geographic shape of Bloomington, with the city divided arbitrarily into yellow, green, blue, and red quadrants that connote the presence of neighborhood associations.[1] Although the colors and shapes do not correlate with anything, the design implies that neighborhood associations reach all corners of the city.

Exhibit 1

CONA Icon of Bloomington, Indiana



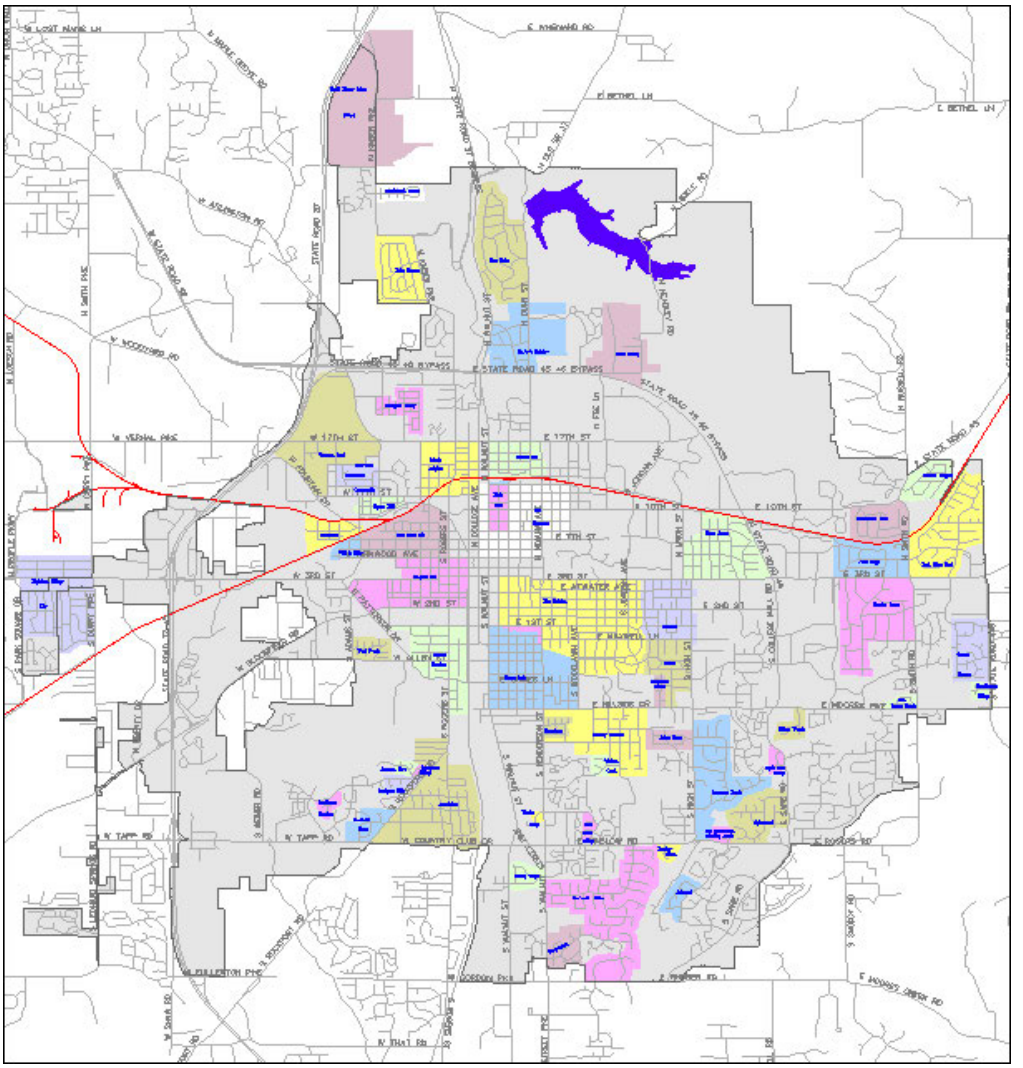
Source: CONA—Bloomington, n.d.

[1] In the print copy of this *Cityscape* issue, exhibit 1 appears in grayscale.

The City of Bloomington uses geographically specific shapes and a variety of colors to map the 55 neighborhood organizations registered with the city (exhibit 2).[2] The streets and landmarks make it possible to identify exactly where neighborhood associations exist in the city.

Exhibit 2

Map of Neighborhood Organizations Registered With the City of Bloomington, Indiana



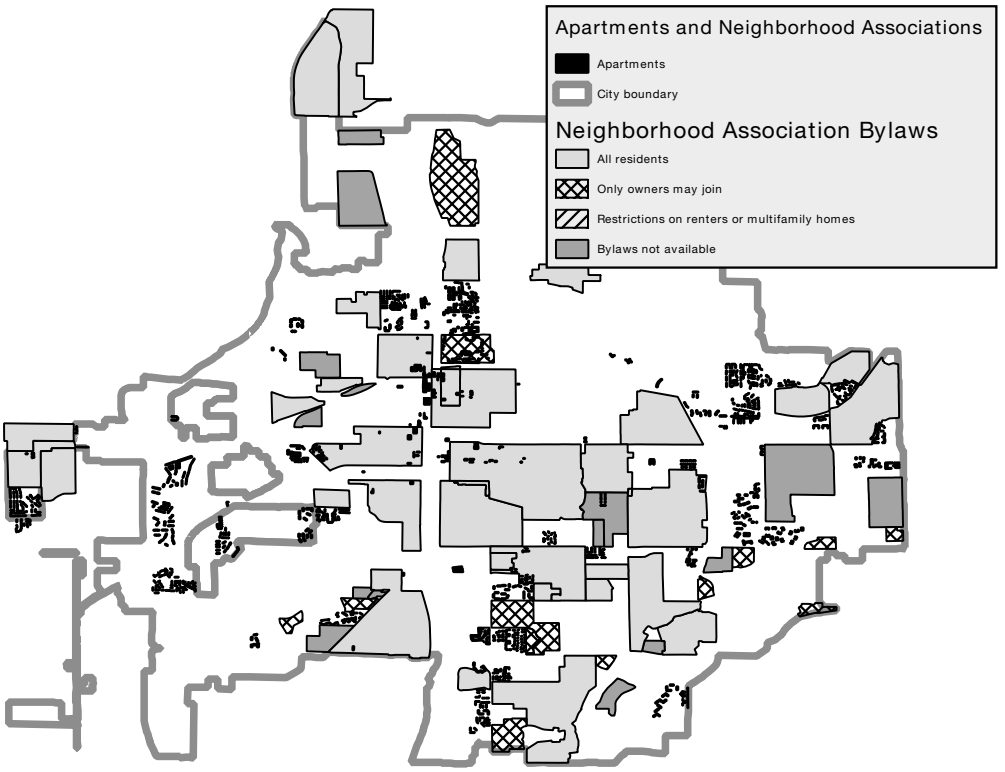
Source: City of Bloomington, Indiana, 2017

[2] In the print copy of this *Cityscape* issue, exhibit 2 appears in grayscale.

Mark Stosberg's map adds more layers of detail—the location of large multifamily properties compared to neighborhood association boundaries—plus links to organizational bylaws (Stosberg, 2021). Among all apartments[3] illustrated in exhibit 3, 81 percent are not in any neighborhood association.[4] Most people in the mapped apartments are truly neighbors, however: 67 percent of excluded buildings are within one-fourth mile—about a 5-minute walk—from the nearest neighborhood association boundary.

Exhibit 3

Location of Large Multifamily Properties Compared to Neighborhood Association Boundaries



Source: Mark Stosberg

Exhibit 3 reveals how neighborhood associations' self-selected boundaries often bypass nearby apartments. The shading also shows which neighborhood associations' bylaws contain text that excludes renters.

[3] In the context of exhibit 3, "apartments" and "renters" are largely similar but not completely synonymous. Many single-family homes in the City of Bloomington are also occupied by renters but are not identified as apartments on this map. Also, some of the apartments highlighted on the map are technically owner-occupied condominium properties.

[4] The multifamily properties mapped in exhibit 3 are buildings that OpenStreetMap labels "apartments." This data set in OpenStreetMap is significant but not comprehensive.

Bloomington has recently revised the city's zoning, including allowing duplexes in areas that for decades have permitted only single-family homes. In one virtual public hearing, about two-thirds of roughly 80 commenters opposed the change, with homeowners generally opposing the inclusion of duplexes and renters largely supporting the initiative (Ladwig, 2021).

Studies indicate that in the United States, those who choose to participate in public hearings on housing proposals are frequently socioeconomically privileged and often hold overwhelmingly negative views of new housing (Einstein, Glick, and Palmer, 2020). Highlighting renters' exclusion from neighborhood associations thus reveals a systemic flaw that perpetuates disparities, especially given the powerful organizational clout in local land use and housing policy decisions.

Summary

Neighborhood associations have a vital role to play by providing a voice for residents on local issues, yet it is essential to recognize that neighborhood organizations dominated by homeowners may seek housing outcomes that do not reflect the needs of the larger community. Future research could investigate homeownership rates within—and outside—neighborhood associations. Mapping can provide visual evidence of disparities, creating important opportunities to pursue more equitable channels to engage residents in local decisionmaking.

Appendix

Creating the Map: A Grassroots Effort

Creating this map did not require professional planning or Geographic Information System (GIS) skills. ArcGIS Online was used for an interactive online map. The free Quantum GIS (QGIS) desktop software was used to adapt the map in exhibit 3 for this publication.

Data	Source	Notes
Neighborhood association boundary data	Open data portal, City of Bloomington	
Large multifamily properties	OpenStreetMap using Overpass Turbo (https://overpass-turbo.eu/)	More than 100 apartment buildings were not initially mapped. Mark Stosberg taught others how to add buildings in OpenStreetMap to complete that layer.
60 PDFs of bylaws for neighborhood associations registered with the city	Open records request, City of Bloomington	Bylaws transferred to spreadsheet for analysis. Software written to merge the spreadsheet and the boundary data.

Authors

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Industrial Revolution

Every home that is built is a representation of compromises made between different and often competing goals: comfort, convenience, durability, energy consumption, maintenance, construction costs, appearance, strength, community acceptance, and resale value. Consumers and developers tend to make tradeoffs among these goals with incomplete information which increases risks and slows the process of innovation in the housing industry. The slowing of innovation, in turn, negatively affects productivity, quality, performance, and value. This department piece features a few promising improvements to the U.S. housing stock, illustrating how advancements in housing technologies can play a vital role in transforming the industry in important ways.

How Can Construction Process Simulation Modeling Aid the Integration of Lean Principles in the Factory-Built Housing Industry?

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Abstract

New and existing factories that produce and deliver factory-built housing can benefit from construction process simulation modeling to explore the integration of Lean principles in their operations. Construction process simulation modeling provides digital or virtual recreations of the real-world factory environments to visualize, quantify, analyze, and optimize their underlying behavior, including factory productivity, material flow, labor dynamics, bottlenecks, and work scope. One of the key benefits of process simulation modeling is the ability to create and compare "what-if" scenarios, including integrating Lean principles such as reducing waste (for example, transportation, waiting), line balancing, and just-in-time concepts.

In general, three process simulation methods are widely used: discrete event simulation (DES), agent-based modeling (ABM), and system dynamics (SD). Myriad process simulation software also is available, but depending on the industry, complexity of the system, and purposes of the simulation, some software might be more appropriate. Similar to how computer-aided design (CAD) software such as AutoCAD™ and Rhinoceros™ enable building design of modular or factory-built housing, process simulation modeling software such as jStrobe™, ProModel™, and AnyLogic™ can enable factory design of new and existing factories to deliver modular affordable housing at scale, as opposed to traditional site-built construction. Software with DES capabilities can help generate a process model that is a logical representation of resources and activities in a factory. Software with CAD-DES integration can leverage product-process data integration to help spatially visualize a DES model of the factory in the CAD environment. Software with multimethod simulation capabilities, widely used in the manufacturing industry, brings together DES, ABM, and SD in a single platform that allows visualization, quantification, analyses, and optimization at varying data fidelities. Near-real-time data from an existing factory can be directly plugged into multimethod simulation software so that the construction process simulation model is a near-accurate representation of the real-world factory conditions. This report provides insights into the use of simulation as an aid to integrate Lean concepts in factories, including guidelines for selecting the appropriate process simulation modeling method and software. These insights have been developed as part of ongoing process simulation modeling research, development, and demonstration projects at the U.S. Department of Housing and Urban Development, the U.S. Department of Energy, and the National Renewable Energy Laboratory focused on how process simulation models can enable better integration of resilience, energy efficiency, and low-carbon design strategies.

Introduction

Lean manufacturing supports production optimization strategy. It originated at the Ford Motor Company in the early 1900s and was later modernized by the Toyota Motor Corporation. Lean approaches focus on the elimination of waste in all forms, including defects, unnecessary processing steps, unnecessary movement of materials or people, waiting time, excess inventory, and overproduction. In 2007, a unique large-scale study on the introduction of Lean production strategies in the factory-built housing industry uncovered existing levels of efficiency and highlighted opportunities for improvement. Participating production departments in nine plants experienced

productivity improvements ranging from 10 percent to more than 100 percent (MHRA, 2007). Factory-built housing's production strategies should therefore include production optimization, and Lean principles can support the objective of increasing production and lowering cost.

The foundation of Lean production is stability and standardization, achieved through streamlining operations while reducing waste. It involves identifying and eliminating nonvalue-added activities throughout the entire value chain to achieve faster customer response, reduced inventories, higher quality, and better human resources. In a Lean production strategy, all improvements and system design are focused on reducing the seven wastes related to transportation, inventory, motion, waiting, overproduction, overprocessing, and defects (Mullens, 2011).

Process simulation modeling complements widely practiced Lean principles and provides better support to decisionmakers in system design and improvement initiatives. A recent study revealed an increasing interest in the link between Lean and process simulation modeling, especially specific methods such as discrete event simulation (DES) (Uriarte, Ng, and Moris, 2020). Furthermore, the study highlighted gaps and future research opportunities, including (1) lack of reviews on the combination of Lean and simulation focused on the application domain, Lean tools, or specific types of simulation; (2) lack of comprehensive frameworks in the combination of Lean and simulation; (3) lack of framework performance and usability evaluations; (4) lack of the combined use of Lean and simulation for educational purposes; (5) lack of the combination of Lean and simulation in the entire lifecycle of the system; and (6) not taking into account Lean principles in the simulation process (Uriarte, Ng, and Moris, 2020).

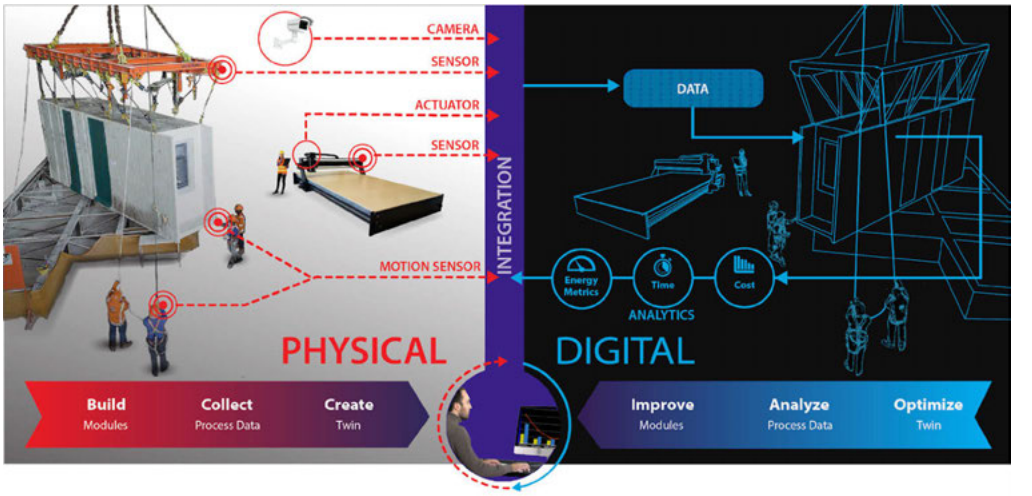
This report provides insights into the use of simulation as an aid to integrate Lean concepts in factories, including guidelines for selecting the appropriate process simulation modeling method and software. These insights have been developed as part of ongoing process simulation modeling research, development, and demonstration projects at the U.S. Department of Housing and Urban Development, the U.S. Department of Energy, and the National Renewable Energy Laboratory focused on how process simulation models can enable better integration of resilience, energy efficiency, and low-carbon design strategies.

Process Simulation Modeling

The authors envision that to modernize factories producing and delivering factory-built housing, builders operating existing factories or gearing up to deploy new factories would take decisions on factory planning and explore opportunities to improve productivity—first, in process simulation models, followed by real-world implementation (exhibit 1). Once a construction process simulation model has been created for a particular factory using data from cameras and sensors, the modular builder can readily inspect the performance of the factory under an endless number of what-if scenarios by changing various spatial and functional aspects of its stations or bays. Because of the high integration between the simulated factory layout, the resources, and the process, the result of any of those changes will be considered in the final performance metric provided by the factory.

Exhibit 1

Conceptual Representation of Construction Process Simulation Modeling



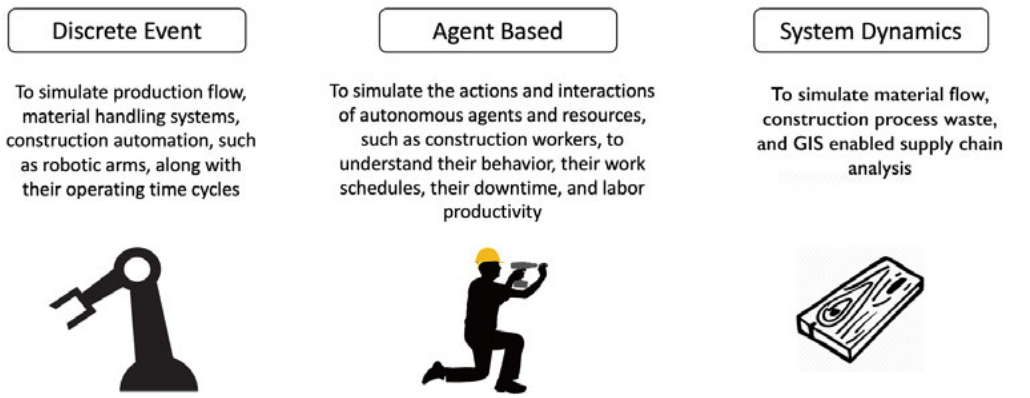
Source: National Renewable Energy Laboratory (NREL)

Process Simulation Modeling Methods

This section expands on widely used process simulation modeling methods that are well suited to the construction processes and can be leveraged by the factory-built housing industry. In general, this section highlights three process simulation modeling methods: discrete event, agent-based, and system dynamics. Each approach can be used as a standalone method for specific processes (exhibit 2). The three methods can also be used as one integrated methodological framework to simulate a complex system, such as a modular construction factory.

Exhibit 2

Three Process Simulation Modeling Methods: Discrete Event, Agent-Based, and System Dynamics



GIS = Geographic Information System.
Source: National Renewable Energy Laboratory (NREL)

Discrete Event Simulation

DES is used for simulation of real-world systems that could be divided into separate processes (events) or sequences of events progressing through time (Barrett et al., 2008). Each of the events happens at a particular instant in time, and the outcome affects the consecutive events. The DES method is based on queuing theory and has been used historically for job allocation and to evaluate telephone scheduling. The overall model simulates how processes respond to random events (such as a completion of a job requested or customer arrival) happening in time—for example, how a production line responds to delayed subprocesses. The DES model is represented as a process flowchart in which individual blocks represent real processes (The AnyLogic Company, 2019). The model can then help with system evaluation, finding "worst-case" scenarios and bottlenecks of the process, and modeling possible what-if scenarios for finding the form of solution. Today, the DES method is widely used in the manufacturing and healthcare industries.

Agent-Based Modeling

Agent-based modeling (ABM) is used to model a system as a collection of agents, which are autonomous decisionmaking entities interacting with each other (Bonabeau, 2002). Using a set of rules, each agent evaluates its situation and makes decisions. The decisionmaking by agents can evolve over time, making their behavior not completely predictable. Models can be very detailed (agents are basically physical objects) or abstract (agents are competing projects). This type of modeling continues to be used in epidemiology, road traffic, population, supply chain, or logistics modeling, specifically when the focus must be on individual objects and their interaction.

System Dynamics

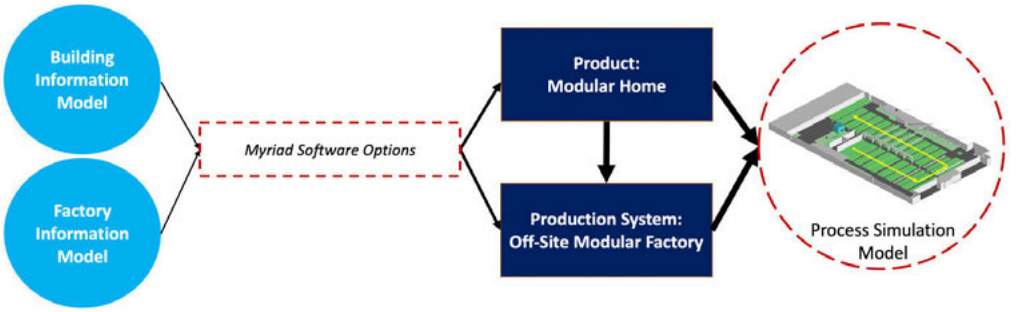
System dynamics (SD) is the oldest simulation process. It focuses on the behavior of very complex systems over time, described with nonlinear behavior, usually in the form of differential equations (System Dynamics Society, 2021). Processes are modeled as a flow between stocks, with loops and time-delayed relationships between the individual parts. System dynamics focuses on the system as a whole when the behavior of the system cannot be described by the behavior of the individual parts. SD modeling has many applications in population, agriculture, economic systems, or modeling behavior of mechanical parts, such as pistons, valve systems, or suspension systems, which all interact with and depend on each other.

Process Simulation Modeling Software

This section expands on recommended software that is available today for builders. To the best of the authors' knowledge, no commercially available software exists that was purpose-built to create process simulation models of factories representing all the activities in new construction at high fidelity. Today, myriad commercially available software options exist to support the creation of building information models (BIMs) and factory information models (FIMs). A FIM can be defined as a fly-through virtual representation of the factory, enabling direct interaction with a wide range of assessments, results, and metrics (Podder et al., 2020). Together, BIM and FIM help create high-fidelity process simulation models of factories through an end-to-end digital workflow, as shown in exhibit 3.

Exhibit 3

End-to-End Digital Workflow



Source: National Renewable Energy Laboratory (NREL)

DES Software

Open-source DES software, such as jStrobe™, can be used for modeling operations that involve uncertainty in durations, require complex activity startup conditions, and involve interdependence of resources (Louis and Dunston, 2017). Such DES software can provide a simple interface and the ability to create a quick DES model that functionally represents the factory. DES software such as jStrobe™ is being actively developed to have seamless data interoperability with game development environments, such as Unity™, to make the DES model run a 3D spatial visualization of the factories (Podder, Louis, and Swanson, 2020). DES software is being specifically used to create DES models of new and existing factories through collaboration with builders across the United States as part of the U.S. Department of Energy-funded project, "Integrating Energy Efficiency in Permanent Modular Construction" (Podder et al., 2020).

Software with CAD-DES Integration

Software with computer-aided design (CAD)-DES integration can leverage product-process data integration to help spatially visualize a DES model of the factory in the CAD environment. An example of such software that is commercially available is ProModel™. It provides reusable predictive analytic solutions with proprietary technologies in all facets of manufacturing and could be applied to the factory-built housing industry. The factory building plan layout and its process model can be created within the same CAD software. CAD-DES integration can also provide several built-in distribution functions, which, in conjunction with process streams, return random values according to a statistical distribution. Such software has proven to minimize the learning curve and maximize the efficiency for modifying large and complex models (Harrell and Price, 2000), which lends itself to builders who may not be familiar with the software and would need to be trained to use it effectively on a daily basis.

Multimethod Simulation Modeling Software

To create the ideal factory, generate what-if scenarios, and understand what governs the integration of cost-effective resilience, energy efficiency, and low-carbon design strategies, builders in the

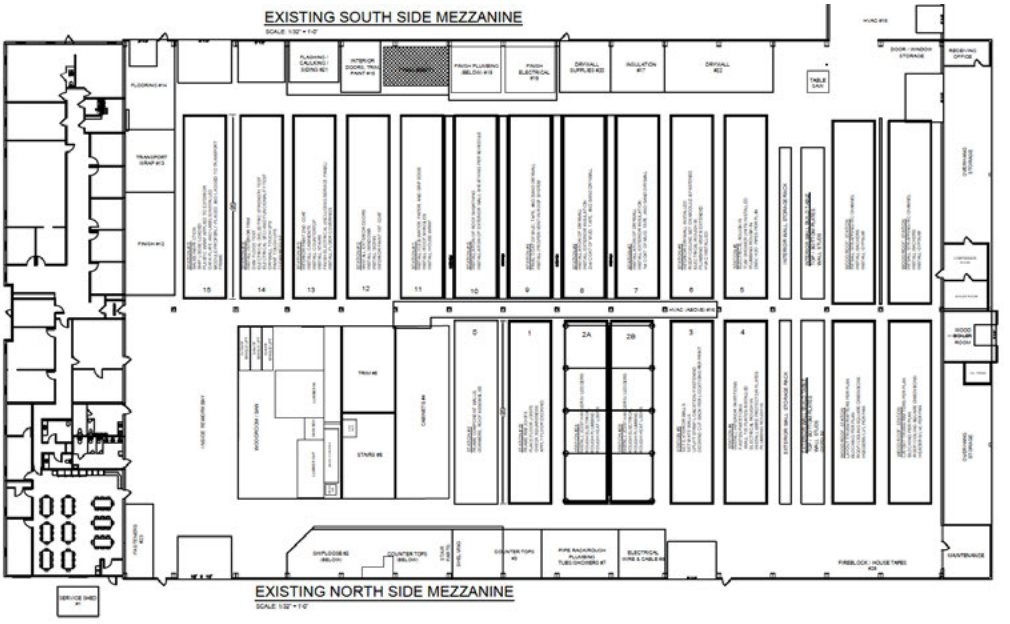
factory-built housing industry need to adopt multimethod simulation modeling. To that end, multiple methods—including DES, ABM, and SD—can be brought together to assist the builders. Multimethod simulation modeling software such as AnyLogic™ has been traditionally used for optimizing manufacturing processes and supply chains of macro-industries.[1] Such software can be used to perform time and cost studies using data from real-world factories, productivity analysis, scaling analysis with supply chain optimization, and waste stream reduction input/output modeling and to create what-if scenarios with solar-plus-storage systems to be integrated during the factory-built process.

Integrating Lean Strategies via Process Simulation Modeling

This section addresses how a real-world Lean improvement project was supported by the approach explained in exhibit 2. Exhibit 4 shows a high-level layout of the U-shaped production line under study for an ongoing simulation development effort, which is housed in a 70,000-square-foot (sq.-ft.) facility with 19 main workstations; all workstations are listed in exhibit 5 in the order of the workflow, from 0 to 15. The last four workstations on the main production line are outside the facility due to limited space. The main production line is supported by six feeder stations (wall framing, etc.).

Exhibit 4

Existing Factory Layout



Source: KBS Builders (case study factory partners with the project team)

The production capacity of this facility, before Lean implementation, is about eight modules per week. On average, units spend 6 hours at each workstation, with a minimum of 3.54 hours and a maximum of 7.57 hours. This time is also known as the "time per move." The time variation is

[1] AnyLogicTM capabilities are explained in this video: https://www.youtube.com/watch?v=9e0F4VtgoaQ.

due to the scope of work completed and the number of workers at each station. This production is supported by 90 workers divided into 23 departments (electrical, carpentry, etc.). One of the indirect labor departments, quality control, is integrated at every workstation to ensure that the modules are built in accordance with the plans and the company's quality standards.

Exhibit 5

Baseline Production Times

Workstations	Major Component	Working Time (hrs)	Percentage of Uptime During Module Moves (%)
0	Walls, Dormers, Roof	5.8	100
1	Floor Framing and Decking	3.54	61
2A & 2B	Raised Plumbing/Electrical Jig	5.80	100
3	Exterior and Mate Wall Set	5.28	91
4	Interior Partition Set	5.23	90
5	Rough Electrical and Plumbing	6.52	112
6	Rough Electrical and Plumbing, Drywall, and Roof Set	6.17	106
7	Exterior Insulation and Drywall	7.57	131
8	Exterior Insulation and Drywall Finish and Sanding	7.54	130
9	Roof Sheathing, Drywall Finish, and Sanding	6.19	107
10	Roof Sheathing and Exterior Wall Sheathing	5.95	103
11	Roofing and House Wrap	7.33	126
12	Windows and Exterior Doors, Siding, and Interior Paint	6.69	115
13	Cabinets, Flooring, Electrical Hookups, Interior Trim	6.86	118
14	Interior Trim, Electrical Tests, Plumbing Tests	5.60	97
15	Touch-up, Exterior Wrap, Ship-Loose, and Labels	3.88	67

Source: Data from case study factory as evaluated by the project team

During the Lean evaluation of the current production layout, the team identified material handling and storage as areas for improvement. In general, the facility has limited storage areas, aisles are crowded, and outside areas are used for temporary storage. Storing material outside the factory not only increases the travel distance to the point of use on the production line but also increases the probability of damage due to exposure to the elements and unnecessary handling. Adding mezzanine space along the North and South sides of the factory would add 4,105 sq. ft. of additional storage inside the factory. That space could be used to store exterior doors, windows, interior doors, bathtubs, and showers, decreasing the travel distance to the point of use. In addition, organizing the existing warehouses and building a new warehouse on the west side of the facility would improve factory operations and allow the outside area to be used for staging completed modules. An additional warehouse (200 sq. ft. x 40 sq. ft.) at the west side of the current factory would add another 3,650 sq. ft. of inside storage. The proposed new warehouse on the west side could store sheet goods and dimensional lumber, which would bring them closer to the mill room and house the receiving department.

The staging and storage areas ideally should be aligned with a designated workstation or point of use to limit the travel distance and material handling. Currently, those areas are too far away from each other, and the staging area must be replenished very often, which slows down the production line. The project team identified several opportunities to reduce distances for more than one-half of the workstations. The team estimated a reduction of about 4,000 ft. of distance if storage areas were relocated closer to the point of use on the production line, decreasing cycle times of major tasks. Opportunities are also available to move feeder stations closer to related workstations. More Lean principles are being continuously implemented via process simulation modeling to improve material handling and streamline operations, with the goal of increasing the estimated production capacity from 8 modules per week to 11 modules per week on average.

Solar-Plus-Storage Evaluation

Once the optimal factory setup was achieved by integrating Lean principles via process simulation modeling, the team evaluated the scope of work to better integrate resilience, energy efficiency, and low-carbon design strategies. The focus of this simulation development effort is the implementation of a solar power array and residential battery storage system installation—"solar-plus-storage." The incremental cost from solar-plus-storage systems installation is composed of subcosts, including factory labor, onsite labor, materials, and prefabricated components related to solar-plus-storage systems; relevant factory construction and material-handling equipment; subcontractors, including solar-plus-storage systems experts; design; and overhead. The cost of labor is typically the component with the greatest variability, and it is determined by a combination of factors, including the scope of work, material and component quantities, inspections, design, factory and site installer composition, hourly installer costs, installer productivity, and factory process efficiency. Focusing on the Lean principle of improving productivity, this simulation development effort intends to leverage process simulation modeling to define key variables that help quantify productivity, as shown in exhibit 6.

Exhibit 6

An Early Version of Mapping Solar-plus-Storage Systems to Relevant Key Metrics to Measure and Verify Its Productivity

Activity	Input (in factory)	Output (in factory)	Baseline to Compare
Installation of rooftop solar PV	Time (in labor hours)	Number of installed solar PV panels	Productivity in site-installed rooftop solar PV
Installation of home battery or storage	Time (in labor hours)	Number of installed units	Productivity in site-installed batteries or storage
Installation of electrical infrastructure	Time (in labor hours)	Number of installed apartment-level conduits and inverters to integrate solar PV and home battery	Productivity in site-installed electrical infrastructure
Distances (e.g., between storage of equipment and work/installation areas or stations/bays)	Time taken to cover the distance	Distance between A and B	Previous distance

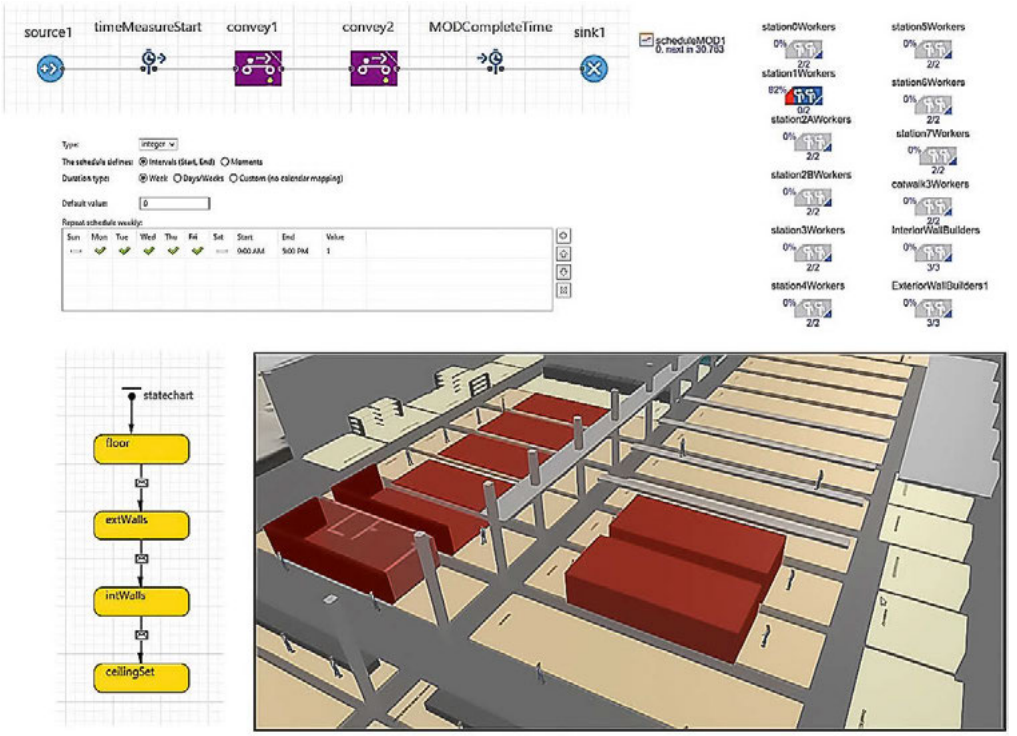
PV = photovoltaics

Source: Data from case study factory as evaluated by the project team

A what-if analysis is a data-intensive simulation with a goal is to inspect the behavior of a complex system (Golfarelli, Rizzi, and Proli, 2006), which in this case is a factory construction and installation process. What-if scenarios are the standard way of using process simulation modeling to analyze cause and effect. Behavior can be presented through various output objects for the end user to study. The end user may give input variables new values, thus influencing the process simulation model behavior. As shown in exhibit 7, input and output variables change the behavior of the process models in the simulation. The primary source of input variables is worker schedules, and the primary source of output variables is the production plan.

Exhibit 7

Construction Process Simulation Model



Note: Shown are process models, worker schedules, worker allocation to each station or bay, planned state changes of the volumetric modular products across different stations or bays in production queue, and a dynamic 3D visualization.

Source: Screengrab of baseline process simulation model in AnyLogic™ by National Renewable Energy Laboratory (NREL)

Conclusion

The insights presented and discussed in this paper have been developed as part of ongoing process simulation modeling research, development, and demonstration projects at the U.S. Department of Housing and Urban Development, the U.S. Department of Energy, and the National Renewable Energy Laboratory focused on how process simulation models can better integrate resilience, energy efficiency, and low-carbon design strategies. The primary stakeholders and beneficiaries of using process simulation modeling and integrating Lean principles are the builders. A modular

builder, in this case, is the entity that owns or operates factories and builds a wide range of subassemblies of components, pods, panels, and volumetric modules to deliver residential projects at scale.

Pros and Cons—How Can Process Simulation Models Assist Builders in the Factory-Built Housing Industry?

The following benefits apply directly to the modular builder:

- Simulation models specific to real-world conditions of factories that represent schedules of workforces would benefit the modular builder in effective project management and construction scheduling using a user-friendly interface.
- Although the modular builder benefits the most from the value proposition of using simulation modeling, benefits trickle throughout the value chain to designers, developers, and tenants or homeowners. Trickle-down benefits include saved time, reduced cost, and improved living.

The following technical and market challenges need to be addressed to ensure wider adoption of simulation models by builders:

- Builders must be incentivized, trained, and supported to adopt simulation modeling and Lean principles. Also important is addressing the skills gap in the construction industry workforce by encouraging simulation experts from the computer science industry to actively explore developing simulation models for factories producing and delivering factory-built housing.
- Inputting data from real-world factories sourced from cameras and sensors should be possible to continuously update the simulation models. A major market penetration challenge, therefore, is the development of low-cost and easy-to-deploy data collection packages, including cameras and sensors, to be used by builders to retrofit their existing factories.

Guidelines—Takeaways for Builders on Best Practices when Interacting with Process Simulation Models

While existing literature such as *Factory Design for Modular Homebuilding* (Mullens, 2011) has disseminated frameworks on productivity improvement and waste reduction, it has not necessarily led to pathways where process simulation models can be used to improve the products and the processes. High-performing builders who are actively engaged in implementing a wide range of Lean principles in their new and existing factories often face challenges in realizing effective interventions in the factory. Using process simulation models will enhance the workflow of builders and will empower them to make more informed decisions, furthering continuous improvement of the factory process to reduce cost and time. The following is a step-by-step description of the guidelines for builders on the workflow when interacting with process simulation models:

1. The modular builder or design team hands off the BIM model of the modular building to its process engineer or factory construction manager.
2. The process engineer or factory construction manager uses the process simulation model on a computer or device to create a digital factory floor plan layout (in 2D).
3. The outputs from the process simulation model are process efficiency (time, cost) and product efficiency (resilience, energy efficiency, low-carbon design strategies), which are of direct interest to the process engineer or factory construction manager.
4. The process engineer or factory construction manager uses the process simulation model to optimize time, cost, and final product quality in a de-risking environment and to create what-if scenarios based on the modular home builder's plans and development stages.
5. The process engineer or factory construction manager looks at those outputs as feedback from process simulation models to inform decisions to implement process changes in the real-world factory.
6. Factory performance is monitored to measure and verify the performance of process changes before and after implementation. The process simulation model is continuously updated and provides continuous feedback on improvements in the real-world factory.

Acknowledgments

The authors would like to thank KBS Builders for continued engagement to ensure success of factory data collection and case study. The authors would also like to thank the U.S. Department of Housing and Urban Development and the U.S. Department of Energy for funding support.

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An Overview of Flood Risk to the Housing Finance Ecosystem

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The views expressed in this article are those of the author and do not represent the official positions or policies of the Office of Policy Development and Research, the U.S. Department of Housing and Urban Development, or the U.S. Government.

A previous version of this article with minor differences was released as a public response to the Federal Housing Finance Agency's Request for Input on the topic of Climate and Natural Disaster Risk to the Regulated Entities.[1,2]

Introduction

Climate change is increasing both the intensity and frequency of natural disasters, leading to higher economic costs. In an annual report, the National Oceanic and Atmospheric Administration (NOAA) documents the incidence of weather and climate disasters resulting in over $1 billion in damage per event, so called "billion-dollar disasters." The 2019 report shows that over the last decade there were 119 such events, a stark increase compared with the previous three decades (29, 53, and 62 from the 1980s, 1990s, and 2000s, respectively) (NOAA, 2019). The changing risk of natural disasters, flooding in particular, is further demonstrated by the increasing frequency of presidential disaster declarations, of which more than 80 percent have been in response to floods and flood-related events such as hurricanes (Kousky et al., 2018). Although some of the increased costs can be attributed to new and higher value developments in vulnerable areas (Wing et al., 2018), recent research on flood events indicates that historical

[1] Official Request for Input available at: https://www.fhfa.gov/Media/PublicAffairs/Documents/Climate-and-Natural-Disaster-RFI.pdf

[2] Submissions available on FHFA's website at: https://www.fhfa.gov/AboutUs/Contact/Pages/input-submissions.aspx

precipitation changes have contributed to roughly one-third of cumulative flood damages from 1988 to 2017 (Davenport is Davenport, Burke, and Diffenbaugh, 2021). Windstorms, rain events, wildfires, sea level rise, and tropical cyclones all pose risk to the United States housing stock, although flooding poses the most widespread threat (NOAA, 2020). NOAA in 2013 estimated that 40 percent of the U.S. population lives in coastal regions (NOAA, 2013; Owens, 2020), with an additional 40 million (12 percent) living in areas that face fluvial or riverine flood risk (Wing et al., 2018). Therefore, this discussion focuses specifically on climate change-induced increases in flood risk to the housing finance ecosystem.

Discussions on climate risks to financial markets generally classify risk into one of two categories. This categorization of risk is also appropriate in the context of housing finance.

Physical risks: Economic costs of the increasing severity and frequency of climate change-driven weather events as well as more gradual changes, such as sea level rise, may erode the value of financial assets.

- In the context of housing, extreme weather events such as hurricanes, floods, or storm surge may damage or destroy homes. Anticipation of future events may lower home (the asset) values over time as risk becomes more salient.

Transition risks: Economic costs that relate to the adjustment toward a low-carbon economy as well as those that relate to coping with the effects of climate change, whether through mitigation, policy, or abandonment of stranded assets.

- In the context of housing, examples include an abrupt repricing of housing markets, stranded assets from inland retreat, property lost to sea level rise, and municipal budget shortfalls as eroded tax bases couple with increasing mitigation budgets in climate-vulnerable areas.

Whereas immediate physical risks of flooding are borne by individual homeowners and communities in flood-prone areas, the transition risks may be transferred throughout the broader financial system and economy. Individual homeowners who live in flood prone-areas face risks ranging from minor property damage to complete loss of home and equity. Neighborhoods and communities subject to more intense and repetitive flooding events may see an increase in damaged infrastructure, abandoned properties, declining property values, and shrinking tax bases. An abrupt tightening of lending in these communities in response to greater perceived risk could lead to further reductions in property values, creating a negative feedback loop of equity loss, mortgage defaults, home abandonment, and declining property values. Communities with similar flood risk profiles may begin to experience similar cycles of property value declines and disinvestment without an acute flood event as homeowners and mortgage investors seek to reduce their exposure to flood risk before it is too late. Nationally, mortgage guarantors such as Federal Housing Administration (FHA), Ginnie Mae, and the government-sponsored enterprises of Freddie Mac and Fannie Mae (the GSEs) could face above-average losses, and access to credit could be constrained as market participants adapt to new risks.

Although housing units of all types are vulnerable to weather and climate related disasters, this commentary focuses on flood risk to single family (1–4 unit) homes. This discussion applies broadly to the entire U.S. mortgage market, not just U.S. Department of Housing and Urban Development (HUD) or Federal Housing Finance Agency (FHFA)-regulated sectors, unless specifically noted. Questions are in bold, followed by a summary answer. Detailed discussions of the literature, complete with citations, follow the summary. Discussion does not imply HUD endorsement of specific findings or positions.

How is flood risk assessed, and how are climate change and current housing development patterns changing the risk footprint?

Current assessment of flood risk through NFIP flood mapping, insurance premiums, and coverage maximums fail to identify and price flood risk appropriately. This could distort incentives and pricing for home buying and new home building in areas at risk of flooding. Furthermore, climate change is expanding the footprint of land susceptible to flooding, and developers continue to build more homes in the path of current and future floods, increasing exposure.

Research finds that federal flood maps maintained by the Federal Emergency Management Agency (FEMA) are the de facto standard in flood mapping (Kousky et al., 2018) and that this is not due to their superiority, but rather their use in determining flood insurance requirements under the National Flood Insurance Program (NFIP). There are two important sets of maps associated with the NFIP, Flood Insurance Rate Maps (FIRMs) and Special Flood Hazard Areas (SFHAs). FIRMs define and map different flood zones based on their probability of flooding. FEMA designates Zones A and Zones V as SFHAs.[3] SFHAs are areas at risk of flooding by an event that has a 1 percent probability annually, also referred to as a 100-year flood. Market lending requirements stipulate that loans for houses inside SFHAs must have flood insurance if they are backed, securitized, or held by HUD, the Veterans Administration, U.S. Department of Agriculture, the GSEs, or federally regulated lending institutions.

The literature identifies several important shortcomings of the FEMA flood maps that may lead to an underestimation of risk. FEMA flood maps were designed to implement the requirements of the NFIP, not serve as a complete flood risk communication tool (Kousky et al., 2018). Another concern is that although the maps are supposed to be updated every 5 years, many area flood maps rely on outdated data or methodologies (National Research Council, 2015). Some areas, particularly rural and less developed areas, have never been mapped at all, or digitized mapping is not available in all areas, inhibiting local areas to have access to flood risk data.[4] A 2013 U.S. Government Accountability Office (GAO) study on tribal participation in the NFIP found that only 7 percent of tribal communities were participating, in part due to a lack of local flood risk data (GAO, 2013). Furthermore, local governments often work with FEMA through the Cooperating Technical Partners (CTP) program to approve changes in official regulatory flood maps. This process can take years to update a local map and introduces a conflict of interest into the process

[3] SFHAs are labeled as Zone A, Zone AO, Zone AH, Zones A1-A30, Zone AE, Zone A99, Zone AR, Zone AR/AE, Zone AR/AO, Zone AR/A1-A30, Zone AR/A, Zone V, Zone VE, & Zones V1-V30 (www.fema.gov).

[4] Exhibit A1 in the appendix shows the age of local area flood maps as well as areas that have not been mapped or still lack digitized mapping (First Street Foundation).

because local officials have a vested interest in reducing risk perception in their communities and preserving property values. FEMA flood maps also fail to capture all types of flood risks, such as stormwater or "pluvial" flooding, which are becoming an increasing threat in developed areas with higher proportions of impervious surfaces.

Another issue with using the NFIP for risk assessment is that housing market participants may interpret insurance premiums as the cost of that risk. In theory, insurance premiums should reflect risk and loss severity for the event insured against and incorporate individual risk factors. Research suggests that NFIP premiums fall short in achieving these objectives. Premiums are largely determined by flood zone, although some house characteristics are used. By one estimate, average premiums fall short of average annual losses by a factor of 4.2 (First Street Foundation, 2021). Furthermore, NFIP coverage is capped at $250,000. With increasing home values and outstanding mortgages balances, potential losses are more likely to exceed this threshold, so even fully compliant insurance may be insufficient to protect homeowners. If homebuyers are using premiums as an assessment of risk, aggregate flood risk will be severely underestimated. On top of these issues, SFHAs are often treated as a binary indicator of flood risk, although flood risk is much more complicated (Kousky, 2018). This suggests that if a property is not located inside an SFHA and the mortgage does not require flood insurance, homeowners may underestimate their exposure to flood risk.

In addition to SFHAs underestimating the flood risk footprint and the cost of flood risk, climate change and housing development patterns are increasing both the risk footprint and risk exposure (Climate Central and Zillow Research, 2019).[5] Although the climate's path over the next 100 years cannot be known with certainty, the scientific community has identified several possible climate trajectories based on different emissions scenarios referred to as Representative Concentration Pathways (RCPs). There are several commonly discussed RCPs on which estimates of changing risk in the literature are often based.[6]

RCP 2.6–Deep emissions cuts, peak by midcentury and reduction by 2100.

RCP 4.5–Moderate emissions cuts, with stabilization before 2100 (Paris Agreement target).

RCP 6.0–High emissions scenario, with stabilization after 2100.

RCP 8.5–Unchecked emissions, extreme scenario.

Future climate trajectory notwithstanding, there is evidence that climate change already is and will continue to exacerbate existing flood risks. Observable effects of climate change such as sea level rise, more intense and more frequent precipitation events, and slower moving tropical cyclones will lead to increased flooding incidence. Warmer waters in the Atlantic and the Gulf of Mexico help tropical cyclones gain intensity and moisture while also slowing down their inland travel. This has led to severe flooding driven by intense rainfall, rather than storm surge, in cases such as Hurricane Harvey in Houston and Hurricane Florence in the Carolinas. Storm surge from tropical

[5] *Risk footprint* refers to the area at risk of flooding, whereas risk exposure refers to the amount or value of houses at risk.

[6] RCP scenarios are as described by the National Oceanic and Atmospheric Administration: https://sos.noaa.gov/datasets/climate-model-temperature-change-rcp-45-2006-2100/

cyclones will also likely increase because it is aided by sea level rise, meaning homes further inland that were previously safe may now be subject to this risk.

Sea-level rise (SLR) poses its own risks outside of tropical events. SLR adds vertical height and lateral reach to coastal tides, leading to more frequent local floods that cover more land for longer stretches of time (Spanger-Siegfried et al., 2017), as shown in exhibit A.2 and exhibit A.3 in the appendix. Increased tidal reach has already led to an increase in coastal flooding (Sweet and Park, 2014). In New York City, floods that were once classified as 1-in-500-year events are already occurring once every 25 years (Kousky et al., 2018), and the large Miami neighborhood of Hialeah experiences chronic street flooding during high tides (Colman, 2020). A 2017 report from the Union of Concerned Scientists finds that an SLR scenario of 4 feet by 2100, consistent with the RCP 4.5, will put more than 490 communities at risk of chronic inundation in the next 40 years, whereas the RCP 6 scenario will leave 670 communities at risk of chronic inundation (Spanger-Siegfried et al., 2017).[7]

Several studies focused on shifting rainfall patterns caused by climate change project increasing flooding in parts of the United States, which leads to higher monetary damages (Kousky et al., 2018; Mallakpour and Villarini, 2015; Prein et al., 2017). Other research utilizing statistical relationships between precipitation and flood damages predicts increasing flood damages with continued global warming (Wobus et al., 2014). However, by disaggregating the increase in flood damages into damages from increased development and damages from increased precipitation, Davenport, Burke, and Diffenbaugh (2021) find evidence that this is already happening.

Whereas climate change increases the geographic footprint of risk, development patterns continue to place more new houses in risk zones, increasing risk exposure even if natural hazard risk remains fixed. One study estimating the present and future flood risk in the United States found that population and the Gross Domestic Product (GDP) growth alone will lead to significant increases in risk exposure (Wing et al., 2018). A team of researchers from online real estate firm Zillow and the non-profit organization Climate Central released a 2018 report comparing new housing growth rates in areas at risk of flooding to safer areas for the 24 coastal states in the United States (Climate Central and Zillow, 2019). The study defines *new homes* as those built after 2009 and before 2017 and uses SLR projections from Kopp et al. (2017) based on the RCP 4.5 scenario to define risk zones. They find that 17,800 new homes that have been built since 2009 will be at risk of flooding during a 10-year-flood event, and 10,500 homes are at risk of flooding during an annual flood event by 2050. They also show that the levels of financial investment in new housing at risk total more than $13 billion for the top 10 states with the most *new homes*, with New Jersey, Florida, and South Carolina reaching $4.61 billion, $3.38 billion, and $1.27 billion, respectively. In addition to the newly constructed homes at risk, 3.4 million existing homes worth approximately $1.75 trillion (today) would be at risk of a 10-year flood event under the RCP 8.5 scenario. This does not include new houses that will continue to be built, so the number of homes and the value at risk will continue to climb without a significant shift in building patterns.

[7] The report defines "communities" as U.S. Census Bureau designated county subdivisions, often distinguishable cities. Ex: Boston, MA; Manhattan, NY; Kiawah Island, SC; Key West, FL.

Demand from institutional real estate investors and insurers has led to a market for commercial flood risk data at the property level, which seeks a more in-depth risk analysis compared with publicly available FEMA flood maps. These companies often include the unmapped risks of stormwater flooding, and they include projected changes in risk based on new development and climate change. There is precedent of various U.S. federal government agencies licensing flood risk data from private data firms for research and regulatory projects.[8]

How do borrower-homebuyers respond to perceived flood risks?

Flood risks can be addressed by several market mechanisms: price discounts, flood mitigation efforts, and flood insurance. Research indicates that markets do price in flood risk, though poorly, overpricing homes by $34 billion nationally. This is due in part to a poor understanding of flood risk and overall weak flood disclosure laws, although there is evidence that the type of buyer may play a role in risk assessment. Individual property level mitigation strategies are often prohibitively expensive, so homeowners generally must rely on community mitigation efforts. On average, homeowners are underinsured against flood risk, due in part to poor understanding of flood risk outside of SFHAs and NFIP flood mapping, an NFIP coverage maximum that falls below replacement costs for many homes, and a lack of real-time tracking of required insurance compliance within SFHAs.

Homebuyers have several ways to respond to perceived flood risk. First, homebuyers may price this risk into the purchase price. In a report on flood risk and the U.S. housing market, Kousky et al. (2018) discuss the literature examining how flood risk is capitalized into home prices. The authors report that a handful of studies find evidence of a discount inside SFHAs (Bernstein, Gustafson, and Lewis, 2019; Bin, Kruse, and Landry, 2008; Daniel, Florax, and Rietveld, 2009; Harrison, Smersh, and Schwartz, 2001; Macdonald et al., 1990); however they note the difficulty in identifying risk effects in coastal areas, given the high amenities found in these locations (Bin and Kruse, 2006; Bin et al., 2008). Beltran, Maddison, and Elliot (2018) perform a meta-analysis of the existing literature that attempts to estimate how flood risk is capitalized into home prices. Covering 37 published studies and 364 point estimates, the authors find estimates of price effects lay anywhere between -75.5 percent (discount) to +61 percent (premium). However, time relative to a flood event and geographical scope seem to play a significant role in determining this capitalization. For instance, homes in coastal regions often sell for higher prices, a result attributed to an inability to control for coastal amenities. Hino and Burke (2020) build on the methodological issues identified in Beltran, Maddison, and Elliot (2018). They use historical FEMA floodplain maps to construct a nationwide panel of floodplain designation, which captures both spatial and temporal variation in flood zone assignment. The authors estimate a national flood zone information discount of 2.1 percent before breaking estimates down into different groupings based on state level flood disclosure laws as well as type of buyer. They ultimately conclude that markets price flood risk into property values, although poorly. To make this assessment, they compare their empirical estimates of the flood zone information discount to two different benchmarks:

[8] For instance, FHFA has purchased a license with First Street Foundation's data, and CoreLogic modeling was used to inform FEMA's Risk Rating 2.0 system.

- Estimates of the present value of the stream of future insurance costs as a percentage of total property value should affect property values by an average of -9.1 percent (-20 percent, -4 percent).

- Estimates of expected flood damages based on NFIP insurance prices should affect prices by 5.1 percent to 10.7 percent, depending on the discount rate.

The authors consider the latter to be the best estimate of flood information discount in an efficient market. By calculating the efficient flood zone discount and the estimated discount for each of the three flood disclosure groupings, the authors conclude housing markets overvalue 3.8 million homes in flood zones by $34 billion. Given that SFHAs act more as a piece of information rather than a complete measure of risk, the authors specify that this figure is an "information discount" rather than a true risk discount.

In contrast to Hino and Burke (2020), who use SFHA designations to determine general flood risk, Bernstein, Gustafson, and Lewis (2019) use the NOAA SLR calculator to determine exposure to sea level rise and estimate the associated price effect in real estate transaction. The estimation strategy defines exposure as any property that would be inundated during a king tide (the highest high tide) under a 6 foot global SLR scenario (consistent with RCP 6) and controls for ZIP Code, distance to the coast, and elevation, in addition to property-specific characteristics. Furthermore, they restrict their sample to transactions from Zillow's ZTRAX dataset for properties within 400 meters of the coast, of which 30 percent are exposed. These properties are then grouped into common bins of 200 foot bands of distance to the coast (0–200, 201–400, etc.) and by 2 meters in elevation. This restriction and binning process eliminates issues in controlling for coastal amenities from previous studies. They find that SLR exposed properties sell at a 6.6 percent discount relative to comparable unexposed properties.

It is important to note that flood risk can only be priced into the market if buyers know about the flood risk. There are no federal flood risk disclosure laws that mandate this information be made available to potential buyers before an offer is made, which may affect the market's ability to capitalize on risks fully. Several studies find evidence that this is the case.

- Chivres and Flores (2002) surveyed a sample of Colorado floodplain homeowners and found that only 8 percent learned about a property's flood risk before they made an offer, whereas 69 percent said they would have changed their offer had they known about this risk and insurance prices beforehand.

- Troy and Romm (2004) found the passage of a stringent law in California that required disclosure of flood risk during real estate transactions increased the price penalty for flood risk.

- Hino and Burke (2020) assess flood information discounts, given different types of disclosure laws, and find that states with the strictest laws have larger discounts.

Although there is wide variation in state-by-state disclosure laws and much opposition from the realtor industry to create federal or state level legislation, there may be momentum from the private and non-profit sectors to making flood risk information more widely available. Online real estate

company, Realtor.com, became the first site to disclose information about property level flood risk as well as potential changes in risk brought on by climate change (Hersher and Sommer, 2020). Additionally, private flood risk data firm First Street Foundation published a nationwide flood risk indicator for millions of properties available for free on their website.

In addition to flood risk disclosure laws, different types of buyers may be better suited to ascertain flood risk in the absence of upfront disclosure. Both the Hino and Burke (2020) and Bernstein, Gustafson, and Lewis (2019) studies find evidence of this. Specifically, Bernstein, Gustafson, and Lewis (2019) report that *sophisticated* buyers, proxied for by the use of non-owner occupancy buyers, have found that the SLR exposure discount is concentrated in the sophisticated (non-owner occupied) segment of the market, with discounts averaging near 10 percent. Hino and Burke (2020) also assess flood information discounts by type of buyer, and they find that homes bought by "business" buyers face a much steeper discount of 6.9 percent, whereas those purchased by non-business buyers (regular homeowners) face a 1.8 percent discount.

The literature identifies two primary means by which flood risk may be mitigated once a property has been purchased: physical mitigation and insurance. Although property-level mitigation measures can be taken, such as raising a structure beyond base flood elevation (BFE), these measures are often too expensive for existing homes. Floodplain management as a mitigation strategy is a municipal-level task and a requirement for a community to be eligible for participation in the NFIP. Thus, insurance is the primary tool for individual homeowners to address risk.

The National Flood Insurance Act of 1968 (NFIA) and the Flood Disaster Protection Act (FDPA) of 1973 (and ensuing amendments) govern the provision of flood insurance for federally backed mortgages requiring flood insurance. For decades, the NFIP has been the only option for homeowners to purchase flood insurance due to the private sector's inability to provide affordable coverage. The Biggert-Waters Act of 2012 requires federal regulators to direct lenders to accept private insurance to satisfy the mandatory purchase requirement.[9] The federal regulators jointly issued a final rule to implement this in February 2019. Current regulations of the FHA do not allow private flood insurance to satisfy this requirement. HUD published a proposed rule in November 2020 seeking comments to amend FHA regulations to permit private flood insurance.[10]

In 2018 there were more than 5 million NFIP policies in force nationwide, 4.8 million of which were for residential property. Kousky et al. (2018) estimate that about 4 percent of all primary residential policies come from private insurers. Estimating the rate of coverage for homes located in SFHAs is much more difficult because there is no national database of structures in the SFHAs that can be matched with policies. However, several studies use surveys or county averages to estimate take-up rates at around 50 percent in SFHAs (Kousky, 2018; Kousky and Michel-Kerjan, 2015; Kriesel and Landry, 2004).

[9] The Federal regulators include Federal Reserve Board (FRB), the Federal Deposit Insurance Corporation (FDIC), the Office of the Comptroller of the Currency (OCC), the National Credit Union Administration (NCUA), and the Farm Credit Administration (FCA).

[10] Details on the proposed rule can be found on the Federal Register. The comment period ended Jan. 22, 2021. https://www.hud.gov/sites/dfiles/SFH/documents/6084_P_01_Flood_Insurance_Proposed_Rule_Published_11_6_2020.pdf

In an analysis of flood insurance take-up rates, Kousky and Lingle (2018) provide county estimates of take-up rates for participating counties within SFHAs and identify some trends. Some findings are not surprising. For instance, most policies are concentrated in coastal counties. While they find that some counties have take-up rates as high as 80 percent, the average is closer to 30 percent. They also note the importance of insurance take-up rates outside SFHAs, given that over 75 percent of buildings flooded by Hurricanes Sandy, Irma, and Harvey were outside the SFHA. They did, however, find some instances where the majority of policies in force were outside SFHAs. In the state of Texas, almost 75 percent of policies in force are outside an SFHA. When Hurricane Harvey struck, only 15 percent of homes in Harris County had policies, but over 70 percent of those were outside SFHAs. This provides a sharp contrast to the analysis of HUD-2M Research (2020), which found patterns of hard cutoffs at the SFHA border in Florida and North Carolina. Although this study offers insights into the utilization of the NFIP by county, and there is evidence at the household level that insurance helps recovery (discussed in the following paragraphs), there are no studies that link insurance take-up rates to post-disaster recovery at the community level.

The primary driver of flood insurance seems to be the mandate, although there are exceptions, such as in the state of Texas mentioned previously. In a discussion of the literature estimating flood insurance price elasticity of demand, Kousky (2018) concludes that current studies, which generally find demand is inelastic (Atreya, Ferreira, and Michel-Kerjan, 2015; Kriesel and Landry, 2004; Landry and Jahan-Parvar, 2011), face many methodological challenges that are not adequately addressed. Kousky does point out that the exogenous price increases from 2012 and 2014 legislative actions could provide an opportunity to overcome these issues.

Two studies give insight to the extent of flood insurance compliance for the FHA insured portfolio. A 2020 HUD-sponsored study with 2M Research linked administrative mortgage level data from FHA with FEMA property level insurance policies and damage claims for a 10-year period in Florida and North Carolina. These data allowed researchers to get detailed insight to compliance rates for a sample of the FHA portfolio (HUD-2M Research, 2020). However, the study still had to rely on matching addresses and latitude-longitude coordinates across databases, which is not a perfect strategy for identifying homes that lie in an SFHA because some lots may have only a portion of the property but no physical structure present in the flood area. To account for this, the researchers created two study samples: a conservative sample that excluded such properties, and a more inclusive sample that counted these. They also consider a third measure, including all properties within 600 meters of the SFHA boundary, to capture potential flood risk just outside the boundary.

Results for North Carolina showed that take-up rates inside the SFHA for the more inclusive sample ranged between 20 percent and 25 percent (lower compliance), whereas take-up rates in the more conservative sample ranged from 48 percent to 55 percent. The conservative sample estimates more closely align with estimates from previous studies. Estimates for take up-rates outside SFHAs were almost identical for both classification strategies at around 1 percent.

Results for Florida showed that take-up rates inside the SFHA for the more inclusive sample ranged between 46 percent and 55 percent, whereas take-up rates in the more conservative sample ranged from 65 percent to 68 percent. The inclusive sample estimates more closely align with estimates from previous studies, whereas the conservative estimate is higher. Again, estimates for take-up

rates outside SFHAs were almost identical for both classification strategies. However, at over 17 percent, take-up rates outside SFHAs were higher at the beginning of the study window in 2011, but they decreased each year until reaching just over 5 percent in 2019. Although only covering two states, this study provides important information on compliance inside SFHAs for one of the most at-risk states (Florida) as well as providing a methodology for measuring compliance rates.

Furthermore, this study shows the difficulty of conducting this research and highlights the need for a real-time, linked database that matches NFIP policies to the FHA portfolio of loans. Beyond understanding compliance within SFHAs, the stark drop in take-up rates that occurs just outside SFHAs indicates that flood insurance is primarily driven by their requirement and that homeowners treat the boundary as a binary indicator of risk.

A 2021 HUD Inspector General report (Hosking, 2021) evaluated FHA-insured loans originated in 2019 for flood insurance compliance. Using FHA and FEMA data, the report identified a set of properties determined to be at risk of not having mandated flood insurance and reviewed a statistical sample for compliance. The report revealed that at least 3,780 loans worth $940 million that closed and were FHA-insured in 2019 were not eligible for FHA-backed mortgage insurance because they did not have the required NFIP coverage. This was due to loans having private insurance instead of the mandated NFIP coverage, insufficient NFIP coverage, or no coverage at the time the loan was closed. This report recommends a federal data set that tracks NFIP compliance for federal housing portfolios.

How does previous research quantify flood risk to the mortgage finance ecosystem?

There are several layers of risk from climate change to the housing finance ecosystem. The first layer is the physical risk that houses may be damaged or destroyed by a flood. This physical risk is propagated by an increase in default risk and prepayment risk for the mortgages associated with damaged homes, putting secondary market mortgage holders and securitizers at risk. Should a securitizer/guarantor be put in jeopardy in the event of accumulating losses, this risk would then be passed on to mortgage security investors. One estimate of physical risk by a non-profit flood-modeling firm identifies 4.2 million homes at risk, with estimated annualized damages of $20 billion in 2021 and over $32 billion by 2051, assuming RCP 4.5 and risk to a 100-year flood. Quantifying the secondary mortgage market risks requires understanding of the homes at risk for flooding, the outstanding balances on the associated mortgages, flood insurance coverage for at-risk properties, who the second market guarantors are, and how the at-risk mortgages are dispersed throughout the mortgage-backed securities market. Currently, no federal or publicly available databases match flood risk to portfolios of the GSEs or Ginnie Mae, who collectively securitize $7.6 trillion of the $11.5 trillion in outstanding mortgage debt.

The first layer of risk is the direct physical risk to structures that may be damaged or destroyed by a flood. There are several ways to think about quantifying physical exposure:

- Number of homes: how many housing structures may be at risk?
- Total value of homes: what is the cumulative value of homes at risk?

- Population at risk: how many people live in homes that are at risk?

Each of these is an important consideration and provides a slightly different perspective of physical risk, and therefore these should be thought of as complementary metrics rather than competing metrics. Furthermore, risk can be thought of as probability of any flood, or probability of a specific flood type, such as storm surge, precipitation, SLR, etc. The nonprofit firm First Street Foundation (FSF) released a 2021 report providing a national assessment of properties at risk based on their proprietary flood models for all types of flood risk.[11] Their report is a publicly available assessment of physical risk at both the national and the state level, regardless of mortgage or flood insurance status. Assuming the RCP 4.5 scenario, the authors examine current risk exposure as of 2021 and future risk exposure as of 2051 under two risk levels. *Any Flood Risk* refers to a property vulnerable to inundation of 1 centimeter or more to the building in the 500-year return period (0.2 percent annual risk or 1/500) now or in the future. *Substantial Flood Risk* refers to a property vulnerable to inundation of 1 centimeter or more to the building in the 100-year return period (1 percent annual risk or 1/100). For each risk level, they calculate Estimated Average Annual Losses (AAL) and annualized damages. Their national level results are summarized in exhibit 1.[12]

Flood risk in exhibit 1 is based on First Street Foundation's proprietary flood model combined with the U.S. Army Corps of Engineers depth damage functions.[13] To compare their risk assessment to the NFIP's assessment, they break down the substantial flood risk category into properties that lie inside the SFHA and those that lie outside the SFHA. They find that only 1.52 million of the 4.26 million houses they identified as being at risk of a 100-year flood are located inside FEMA-designated SFHAs, a designation intended to represent that same level of risk. This highlights the disparity between commercially available flood modeling and NFIP flood maps.

Exhibit 1

National Single Family Residential Risk Profile 2021 vs 2051 Flooding of any Source

	FSF Model Used	Total Properties at Risk (millions)	FSF Est. AAL		Annualized damage (billions of dollars)	
			2021	2051	2021	2051
Any Flood Risk	1/500 Layer	5.71	$3,548	$5,913	$20.3	$34
Substantial Flood Risk	1/100 Layer	4.26	$4,694	$7,563	$20	$32.3

Source: Table data compiled from First Street Foundation (FSF), The Cost of Climate: America's Growing Flood Risk

As part of the previously discussed HUD-2M Research study, the researchers calculated two measures of the FHA-insured portfolio at risk of flooding. The first was properties inside the SFHA (with a conservative and inclusive sample), and the second was all properties inside the SFHA

[11] Discussion of specific commercial products does not offer endorsement of any company or their products.

[12] AAL are based on the U.S. Army Core of Engineers (USACE) depth damage functions for riverine and storm surge flooding and an internal proprietary "precipitation-induced flooding" depth damage function.

[13] The model description and methodology can be found at https://assets.firststreet.org/uploads/2020/06/FSF_Flood_Model_Technical_Documentation.pdf Disclaimer: "First Street Foundation's flood and climate change risk and damage estimates are based on one or more models designed to approximate risk and are not intended as precise estimates, or to be a comprehensive analysis of all possible flood-related and climate change risks."

and within 600 meters of the boundary. They found that the number of insured properties for both measures increased over the study window, although for both states and both measures the proportion of the overall FHA portfolio remained constant. Exhibit 2 summarizes their findings.

Exhibit 2

At-Risk FHA-Insured Properties for Florida and North Carolina

	Year	Total Properties	Properties within SFHA		Properties within 600 meters of SFHA	
			Total Number	Percent of Portfolio	Total Number	Percent of Portfolio
North Carolina	2011	26,303	1,277	4.9	14,202	54.0
	2019	177,195	8,673	4.9	95,840	54.1
Florida	2011	57,479	12,692	22.1	47,298	82.3
	2019	496,597	101,128	20.4	399,271	80.4

FHA = Federal Housing Administration. SFHA = Special Flood Hazard Area.

Source: Data compiled from HUD-2M Research 2020 study, Flood Insurance Coverage of FHA Single-Family Homes

Similar to the First Street Foundation report, the two different measures of flood risk employed in this study also show stark disparities between risk assessments based on the NFIP flood maps and more broadly defined flood zones. Exhibit 2 also highlights another important trend, that risk is not evenly dispersed across states.

In a study examining the role of flood damage, flood insurance, and performance for mortgages backed by Fannie Mae after Hurricane Harvey, the authors find that out of 302,000 active, current mortgages inside the storm-affected area, 27,000 homes have post-disaster home inspection records (Kousky, Palim, and Pan, 2020). This implies that 8.9 percent of homes in Fannie Mae's Houston-area portfolio were subject to flood damage from Hurricane Harvey, although only 7 percent of these damaged homes were in the SFHA.[14]

What are household/borrower outcomes after a flood event?

There is evidence in the literature that storm damage increases mortgage default risk overall, but flood insurance plays a significant role in determining financial outcomes for households who experience a flood. Homeowners with insurance are less likely to default and more likely to rebuild after a flood compared with those without. However, there is some nuance to these findings. There is evidence that increasing levels of property damage, or whether the lender is local or non-local, influence decisions to rebuild or use insurance payouts to pay off the mortgage and move. Federal aid programs offered through FEMA, HUD, and the Small Business Administration (SBA) can serve as another source of post-disaster resistance.

From the perspective of the GSEs and other mortgage holders/securitizers, default and prepayment both pose a risk to the agencies' ability to guarantee the stream of payments associated with their issues of mortgage-backed securities. Ultimately, it was this burden that put the agencies in financial distress during the subprime crisis (Frame et al., 2015). Therefore, understanding the

[14] Authors own calculations, based on reported results from study.

risk associated with guaranteeing these income streams in light of a climate change-driven crash in regional/national housing values is paramount.

After a flood event, homeowners have options to repair and rebuild or sell and move. The cost of replacing belongings and repairing or rebuilding damaged homes can pose a significant financial challenge to the homeowners' ability to maintain mortgage payments. The primary function of flood insurance is to assist homeowners in this recovery. There are additional programs and sources of financing, such as higher credit utilization or secondary financing, as well as federal assistance. HUD, SBA, and FEMA are the three primary sources of federal assistance.[15]

In response to Presidential Disaster Declarations, HUD's Disaster Recovery Community Development Block Grants (CDBG-DR) provide flexible grants to states and municipalities to administer locally, with a portion of funds dedicated to lower income areas that are less likely to be high-risk flood zones and have lower flood insurance take-up rates (FEMA, 2018, as cited in Kousky et al., 2018).[16] There is evidence from the previously mentioned 2011 HUD study on CDBG-DR use post-Hurricane Katrina that the funds dedicated to lower income areas reach their intended recipients Turnham et al. (2011). Through the Disaster Loan Program administered by SBA, affected business owners and homeowners can apply for low-interest loans to "repair, rehabilitate, or replace property." These loans must be paid back to the federal government with interest, and their primary function is to bring a structure back to a safe condition, not full restoration. Households may also receive direct assistance through FEMA's Individuals and Household Program (IHP). However, grants through this program have a cap of just over $30,000 and have averaged closer to $5,500 (Kousky, 2018), so this is a limited source of financial assistance. Given the approximately 50 percent compliance rate of mandatory flood insurance in the SFHAs and the much lower voluntary take-up rates outside, it is possible that many homeowners with flood damages face significant financial difficulties, which pose risks to mortgage performance. Several studies provide insight into the effect of flood damage on homeowner financial outcomes as well as the role flood insurance and other disaster relief programs play in mitigating negative outcomes.

The previously discussed HUD-2M Research (2020) study considers several relationships between NFIP claims, insurance premiums, and loan performance within the FHA portfolio. Relevant to this discussion, the study team analyzed the effect of a flood insurance claim on loan performance of an FHA-insured mortgage for the subset of loans with active flood insurance policies. Using a logistic regression in which the dependent variable is a binary indicator for the first time a loan was in default, they consider the effects of a flood claim 1 year prior and 2 years prior, for the subsample of mortgages with flood insurance for each state. In summary, for both North Carolina and Florida, the relative likelihood of defaulting in the next year is larger when an FHA-insured property has at least one flood insurance claim in the current year than when the FHA-insured property has no flood insurance claims in the current year. In all three specifications considered, a property with at least one claim in the previous year is 1.6 to 1.8 times more likely to be in default during the current year, significant at the 95 percent confidence level. Only in the specification including controls for

[15] See Kousky et al. (2018) for more detailed discussions on each of these sources of funding.

[16] Funding for CDBG-DR requires additional congressional appropriations because the program does not have standing funding.

monthly payment and monthly effective income does a flood claim 2 years prior have a statistically significant effect of being more than twice as likely to default (at the 95 percent confidence level). This analysis does not include properties without flood insurance, however, so there is no insight to the effect flood insurance has on mortgage outcomes compared to uninsured mortgages.

The 2011 HUD study used a survey of individuals who owned properties in 2005 that were destroyed by Hurricanes Katrina and Rita to examine how CDBG-DR were used in rebuilding in Louisiana, Mississippi, and Texas. Employing a multivariate analysis of factors that influenced the likelihood of rebuilding, the authors found households covered by flood insurance were 37 percent more likely to rebuild after Hurricanes Katrina and Rita compared with households without insurance (Turnham et al., 2011). Homeowners with an active mortgage, however, were 13 percent less likely to rebuild, all other things being equal. The authors further investigated the interaction between these two variables by estimating the effect of having an active mortgage on the decision to rebuild among the fully insured sample; they found that those with a mortgage were more than 11 percent less likely to rebuild, indicating that homeowners may use insurance proceeds to pay off a mortgage and move rather than rebuild, although the study does not draw this conclusion.[17]

In another study focused on Hurricane Katrina, Gallagher and Hartley (2017) looked for a causal effect of the storm on key household finance distress indicators. They found modest evidence of credit card usage for consumption smoothing, increasing balances approximately $500 (15 percent) for the *most-flooded* group compared to *non-flooded*, though such effects are short lived. They also found that the *most-flooded* residents have general debt delinquency rates 10 percent higher than *non-flooded* residents on credit reports, although 2 years later, credit scores were only .06 standard deviations lower. Contrary to expected negative impacts on financial stability, the authors found that total debt decreases for the *most-flooded* residents. They concluded the relatively larger reductions in total debt for the *most-flooded* residents are driven by homeowners using flood insurance to prepay their mortgages rather than rebuild, with two key determinants behind the prepay decision. First, this was most commonly seen in areas where reconstruction costs exceeded pre-storm home values. Second, mortgages that were originated by non-local lenders were more likely to prepay than rebuild.

To examine the role of local versus nonlocal mortgage lenders in borrowers' post-flood outcomes, they categorize local lenders as those whose share of New Orleans-based loans exceed that of the median lender. They found borrowers from nonlocal lenders are more likely to pay down mortgage with insurance claim proceeds compared to borrowers with local lenders. Furthermore, they found that local lenders returned to pre-Katrina lending levels 2 years later, whereas nonlocal lenders largely exited the market. This finding on the role of nonlocal lending institutions in the decision to rebuild adds important context to the discussion on flood damage-induced prepayment risk, as well as the discussion on community resiliency.

Taking a slightly different approach, Kousky, Palim, and Pan (2020) used Hurricane Harvey as a case study and data from Fannie Mae to examine the link between flood insurance, property damage, and mortgage credit risk. Utilizing home-specific, post-damage home inspection data for 30,000 homes, the authors examined risk from the perspective of the credit risk holder (Fannie

[17] All results discussed from this study were statistically significant at least at the 90 percent confidence level.

Mae) in what they claim to be the first paper to quantify the protective benefits of flood insurance on loan performance. When first examining the link between flood damage and mortgage performance, they found that moderately to severely damaged homes are three times more likely to become delinquent after the storm compared to undamaged homes, and they conclude that flood insurance has no short-term effect. Longer-term performance (180 days delinquent/default) depends on insurance coverage. Assuming that property location within an SFHA implies having a flood insurance policy (100 percent compliance) and location outside an SFHA implies no coverage, they compare outcomes for houses inside SFHAs to those outside.[18] They found that for homes inside SFHAs with flood insurance, prepayment rises with property damage by a factor of 2.1 compared to undamaged homes. There is no difference in prepayment for damaged homes outside SFHAs (uninsured homes) compared with undamaged homes, corroborating the results suggesting that insurance coverage leads to prepayment discussed in Gallagher and Hartley (2017). Outside of SFHAs, increasing damage increases the need for loan modification and the likelihood of the mortgage becoming 180 days delinquent or in default 2 years after a storm.

The relative scarcity of studies examining this issue demonstrates the data limitations relating to matching insurance policies directly to mortgage information, which make this problem particularly difficult to study. This further highlights the need for an automated data set linking mortgages to flood insurance policies.

How are mortgage market participants altering their behavior?

Currently, information on flood risk and consequences is asymmetric. This asymmetry results in observable differences in mortgage lending, securitization, and investing decisions by groups. Most importantly, there is evidence that originators may be selling mortgages on properties with higher flood risk to be securitized and keeping less risky mortgages in their own portfolios, transferring the flood risk to the GSEs. There is preliminary evidence that borrowers are structuring their mortgages to protect themselves from equity loss in the event of a destructive storm surge, which also has the effect of transferring risk to the mortgage holders/securitizers. Rating agencies and large institutional investors are incorporating climate risk into their modeling.

Two recent studies examine the behavior of mortgage originators and how specific behaviors are increasing the risk borne by the agencies. First, Ouazad and Khan (2019) explored mortgage lender securitization patterns before and after a flood event that causes over $1 billion in damage and the exploitation of exogenous (with respect to natural disasters) changes in the conforming loan limit. They found that after a billion-dollar event, originators are significantly more likely to increase the share of mortgages originated and securitized right below the conforming loan limit. The authors conclude that they do this in response to learning new information on flood risk, resulting in originators selling higher risk mortgages to agencies for securitization and keeping less risky mortgages on their own books. This offloads increasing amounts of risk to government-

[18] It should be noted that this is a strong assumption given most insurance studies find take-up rates closer to 50 percent (Kousky and Lingle, 2018). However, this overestimation of insurance coverage is likely to bias the estimated effect of coverage on post-flood outcomes downward. Likewise, the assumption of being outside SFHA implying noncoverage is also strong for the Houston area, as Kousky and Lingle (2018) find that Texas has higher than normal non-SFHA. This too may bias the estimates of the effect of insurance downward. With two potential downward biases, the true effect may be larger than reported.

sponsored enterprises. Furthermore, because the GSEs do not currently price in flood risk to their guarantee fees, they are effectively subsidizing the construction and purchasing of homes in areas at increasing risk of flooding due to climate change.

Second, Keenan and Bradt (2020) outlined a theoretical foundation for a process they called "*Underwaterwriting*" (UWW) and then provided empirical evidence for its existence. In this practice, local mortgage lenders utilize advantages in asymmetric information to structure loans to offload the risks from themselves. They showed that in 2009, local banks along Southeast Atlantic and Gulf coasts sold off 43 percent of their mortgages in flood zones, comparable to the share they sold off in areas not at risk of flooding. By 2017, this share had increased to 57 percent in flood zones, whereas the remaining share was relatively flat in less vulnerable neighborhoods. The authors also found that the lenders selling off coastal mortgages the fastest are smaller local banks, which are more likely than large national banks to know which neighborhoods face the greatest climate risk. "*They have their ears to the ground,*" Dr. Keenan said in an interview discussing the article, although this seems to be regionally isolated to the Southeast Atlantic and Gulf coasts. This finding adds additional context to the discussion on the role that local versus nonlocal lending institutions can play in local mortgage markets' response to flooding as discussed in Gallagher and Hartley (2017). Beyond the transference of risk from local lenders to mortgage securitizers, the authors also discuss implications for credit availability in SLR-exposed regions. Specifically, the authors note that in the absence of standardized assessment data, the market advantage of locally concentrated lenders could strengthen as SLR and coastal flooding intensify, leading to an unevenness in mortgage availability and pricing. Furthermore, UWW could cause credit availability to be increasingly constrained because nationally diversified lenders charge higher interest rates to account for locally concentrated lenders' ability to cherry-pick the most credit-worthy borrowers. However, the authors note that, at present, it is likely that upfront yields from points and servicing fees, combined with market share considerations, supersede the need for a climate risk-driven repricing of mortgage credit to account for their current informational disadvantage

Two previously discussed studies (Bernstein, Gustafson, and Lewis, 2019; Hino and Burke, 2020) showed that there is some variation of home purchasing behavior by the type of buyer. It is plausible that sophisticated or institutional home buyers have more robust systems for assessing flood risk and, therefore, a greater willingness to pay. In addition to this, preliminary work by Economist Dr. Amine Ouazad finds evidence that homebuyers in areas subject to storm surge are opting for alternative mortgage products to the standard 30-year mortgage (Ouzad, 2020). In most of the country, 90 percent of mortgages are the standard 30-year fixed rate mortgage. However, since the housing crash, this share has fallen to 80 percent in areas at risk of storm surge, in large part driven by interest-only loans, which accounted for over 10 percent of mortgages in 2016 in these areas compared with 2.6 percent of mortgages elsewhere. Interest-only loans protect borrowers from equity loss in the event of a catastrophic disaster because their monthly payments have not been put toward equity. In an interview, Dr. Ouazad notes that his results are still preliminary and need further work, but says there is reason to think climate risks could be driving this behavior (Flavelle, 2020).[19]

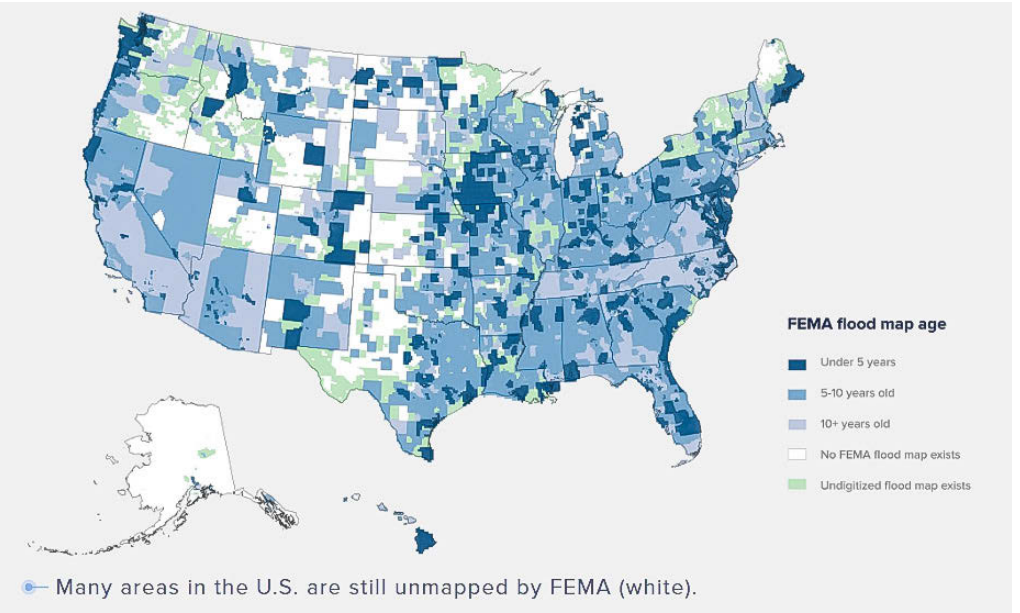
[19] For instance, one alternative explanation could be if these home purchases were for second homes or rental properties, which may be more likely in coastal areas.

As flood risk continues to propagate through the housing finance ecosystem, it moves from homeowners and communities to mortgage holders and securitizers, and finally from securitizers to mortgage security investors. Agency securitizers do not price in flood risk in the guarantee fees they charge or through other means, and flood risk is not yet clearly priced into mortgage-backed securities (MBSs), if at all (Owens, 2020). If investors and rating agencies begin to identify this risk in a disorganized manner, this could lead to an increase in volatility in the otherwise relatively stable mortgage-backed security market, putting millions of investors at risk. In his 2020 letter to CEOs, Larry Fink said, "climate risk is investment risk" (Fink, 2020). With the increase in the number of private sector catastrophe modeling firms and large improvements in modeling capabilities, institutional investors, rating firms, and other entities will be able to develop their own insights into residential mortgage flood risk's downstream risk to MBSs. There is some evidence that investors are already responding to perceived flood risk to the properties underlying MBSs. As covered in a *Politico* article, "When the credit risk transfer market settled after Harvey, the Association of Mortgage Investors, a trade group representing mortgage securities buyers, asked Fannie Mae and Freddie Mac to remove mortgages vulnerable to climate change from those offerings" (Colman, 2020). Fitch Ratings became the first rating agency to announce that it will begin incorporating climate risks into its rating of residential mortgage-backed securities, primarily for mortgage pools based in Florida and California (Duguid, 2019).

Appendix

Exhibit A.1

FEMA Flood Map Age

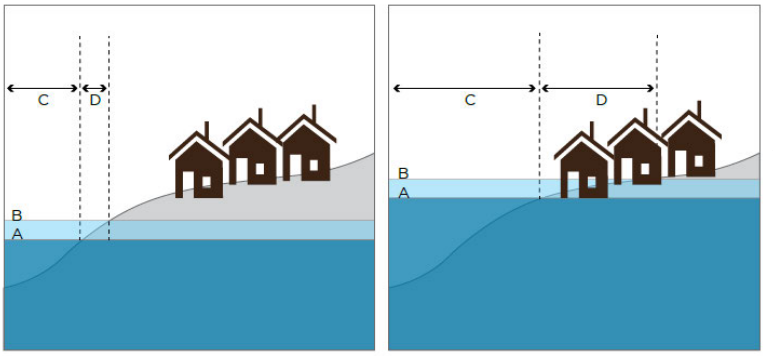


FEMA = Federal Emergency Management Agency.

Source: First Street Foundation report, The Cost of Climate: America's Growing Flood Risk

Exhibit A.2

How Sea Level Rise Causes Chronic Inundation



A. High tide level
B. Chronic tidal flooding level
C. Permanent inundation zone (underwater with each high tide)
D. Chronic inundation zone (underwater 26X/year)

Today **With Sea Level Rise**

When higher sea levels are aded on top of the normal variations in tide height, the more extreme high tides can reach onto normally dry land. As sea level rises further, this occasional flooding can become chronic, as less extreme tides begin to cause flooding as well. The left panel shows current high tide and the extended reach of extreme tides, which defines a chronic inundation, or limited-use zone. The right panel shows how sea level rise later in the century has expanded the reach of not just extreme tides but also more typical tides such that some land is permanently inundated and a greater portion of the community is chronically flooded.

Source: Union of Concerned Scientists 2017, When Rising Tides Hit Home

Exhibit A.3

How Sea Level Rise Causes Chronic Inundation

Today **In 30 Years** **In 45 Years**

As sea level rise extends the zone of chronic inundation deeper into communities, chronic flooding may affect commercial, industrial, and residential areas, along with key infrastructure. The left panel shows the current zone of chronic inundation (light blue) in an East Coast community. The center panel shows the chronic inundation zone in 2045, when a densely developed neighborhood can expect to have to deal with twice monthly saltwater inundation. The right panel shows the chronic inundation zone in 2060, when much of the town's coastal area floods with regularity—a sobering challenge for local and state governments.*

SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, NCES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

**light gray in the printed version of this issue.*

Source: Union of Concerned Scientists 2017, When Rising Tides Hit Home

Acknowledgments

The author would like to thank Chris Narducci and Adam Hoffberg from the U.S. Department of Housing and Urban Development for their extensive feedback during the writing process. The author is also grateful for comments and questions received during presentations of this work from the Federal Housing Administration and Ginnie Mae.

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SpAM

SpAM (Spatial Analysis and Methods) presents short articles on the use of spatial statistical techniques for housing or urban development research. Through this department of Cityscape, the Office of Policy Development and Research introduces readers to the use of emerging spatial data analysis methods or techniques for measuring geographic relationships in research data. Researchers increasingly use these new techniques to enhance their understanding of urban patterns but often do not have access to short demonstration articles for applied guidance. If you have an idea for an article of no more than 3,000 words presenting an applied spatial data analysis method or technique, please send a one-paragraph abstract to rwilson@umbc.edu for review.

A Method for Defining Downtown Business District Boundaries in Pre-Automobile Towns and Cities

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Abstract

This short article presents a method for illustrating the spatial delineation of downtown business districts in non-metropolitan counties. Although smaller than their urban counterparts, rural and exurban municipalities established before World War II typically contain a central business district, which is the dense colocation of commercial and civic activity comprising buildings and streetscapes that were developed before the automobile era and are thus oriented toward pedestrian traffic. The paper describes the method for distinguishing downtown business districts from postwar, automobile-oriented malls and retail development. A variety of use cases are discussed, highlighting the potential importance of this data for researchers and practitioners of economic development and planning.

Introduction

In the fallout of World War II and the emergence of the family automobile, America's central business districts—*downtowns*—gradually ceased to serve as the epicenters of civic and commercial

activity throughout the country (Cohen, 1996). In the latter half of the 20th century, policymakers and researchers began paying more attention to the vitality of central business districts, guided by the idea that a regional economy is more competitive when the central city is vibrant and healthy (Hill, Wolman, and Ford, 1995; Porter, 1995). As a result, downtown redevelopment and revitalization projects have become popular approaches for policymakers seeking to inject vibrancy and economic stability into central business districts.

In such contexts, researchers and practitioners benefit from the availability of accurate spatial data. Effective administration of place-based policies and programs requires the concrete delineation of the area targeted by the policy. In many large cities, district or neighborhood boundaries, including downtown, are clearly defined by the city and are made publicly available for use in tourism, marketing, and economic development.[1] This demarcation may not be the case for smaller communities. Without dedicated GIS (geographic information systems) data, analysts, and modern online file-hosting capabilities, the task of identifying downtown district boundaries in smaller communities is neither straightforward nor practical.

This paper presents a spatial method—which the author calls "downtown district delineation" (D3)—to spatially delineate downtown business districts in smaller communities.[2] As its primary output, D3 generates a GIS data file, which represents the approximate boundaries of a community's downtown district(s). The paper also includes a detailed description of the method and a discussion of how the generated data may be appropriately used in research or practice.

Procedure

The D3 procedure involves three general steps. First, business establishments are plotted onto a map of a given municipality, and the relative density of establishments is calculated for the entire area of the jurisdiction. Second, locales with adjacent, high-density cells are identified and aggregated. Finally, a single grouping of establishments is selected—according to density, size, and centrality—and a polygon is generated. The polygon may then be saved as a new layer and used to identify the spatial boundary of the given municipality's downtown district.

[1] For example, the City of Atlanta and the City of Des Moines both provide PDF maps of city districts and neighborhoods that clearly communicate where the downtown district begins and ends (available here and here, respectively). The City of Austin, Texas, has a specific downtown webmap with GIS overlays of the planning districts within its central business district (available here). Most central cities in large metros have one of the two options available online.

[2] Although this paper's method was designed to delineate pre-automobile downtowns in rural and micropolitan areas—such as the town used as an example throughout the paper (Bradford, Pennsylvania)—the method can be used in a metropolitan context. Despite slower computer processing times because of large amounts of data, the D3 method performed well in metropolitan cities, identifying downtown districts such as that of Altoona, Pennsylvania, (the central city of a smaller metro area) and Greensburg, Pennsylvania (an outlying city in the Pittsburgh metro area). The context in which the D3 method is unlikely to work accurately—aside from automobile-era suburbs—is in central cities of large metropolitan areas (e.g., Pittsburgh) because downtown's former dominance in many larger American metros has been "eroded by the growth of suburban employment centers" (Bogart and Ferry, 1999), and the density gradient of large urban downtowns may be interrupted by the prevalence of off-street surface parking (Manville and Shoup, 2005).

Setup

Because the central business district typically coincides with historic buildings and development, attempts to identify "downtown" in a newly developed suburban area would likely yield incorrect results. As used in previous studies (Van Leuven, 2021, Forthcoming), the following heuristic is recommended for identifying municipalities that are likely to possess a pre-automobile downtown district:

- A municipality that had a 1920, 1930, or 1940 population of at least 1,000. This guideline identifies municipalities that were "largely built up before 1945" (Cervero and Gorham, 1995), before the automobile era.
- A municipality that has a present-day (or nearest decennial census year) population that exceeds 1,000 residents. This threshold is practical; it is set to avoid the analysis of "boom towns" whose populations have declined dramatically from their early-20th-century peak.

Once applicable communities are identified,[3] the analyst must collect the requisite data to be used as input for the D3 method. At a minimum, this method requires at least 1 year of business establishment data, in which every establishment is present and is paired with an industry sector code and geographic coordinates (i.e., latitude and longitude). Using additional years of data will reduce statistical noise because of the larger sample size, resulting in more robust delineations of the downtown district.

Although the following method will be described *conceptually*—in widely understood statistical terms and GIS operations—the underlying code for this method will be available in the online appendix.[4]

Step 1: Creating the Density Map

Creating the density map requires three tasks. First, municipal boundaries must be available and plotted to delineate the coverage area.[5] Second, the business establishment locations must be plotted using the latitude and longitude coordinates.[6] Third, the entire municipality must be divided into cells, sized appropriately for the area being analyzed (exhibit 1 presents two types of grid options applied to the shape of Bradford, Pennsylvania). The author recommends the hexagonal grid rather than the square grid, especially for municipalities with street networks that

[3] This heuristic is not guaranteed to identify *all* municipalities with a pre-automobile downtown business district. For example, the Town of Fremont, Indiana, has a traditional downtown but misses the threshold for consideration because of its historical population. Although its 2010 population (2,138) exceeds 750, its prewar decennial census population never rose above 1,000. An analyst specifically focusing on Fremont or Northeast Indiana would likely relax the guidelines to include Fremont; however, when focusing on the entire state, adhering to a clear set of guidelines may be more practical.

[4] Many statistical and GIS software packages are capable of implementing this method. The author used the "R" program, specifically the SpatialKDE R package (Caha, 2020) in the "RStudio" environment.

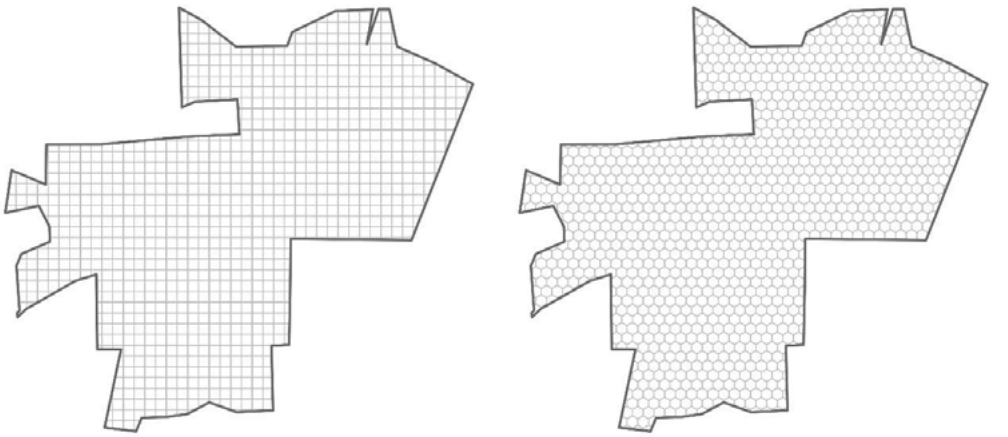
[5] A useful source of municipality boundary geospatial data files is the U.S. Census Bureau's TIGER/Line® file repository, found here.

[6] The example maps in this paper use business establishment data from the "Infogroup U.S. Historical Business Data" (Infogroup, 2020).

follow irregular features, such as rivers or railroads.[7] These three characteristics should be plotted together in a GIS for the analysis.

Exhibit 1

Comparison of Square and Hexagonal Cell Grid Tessellation of Bradford, Pennsylvania



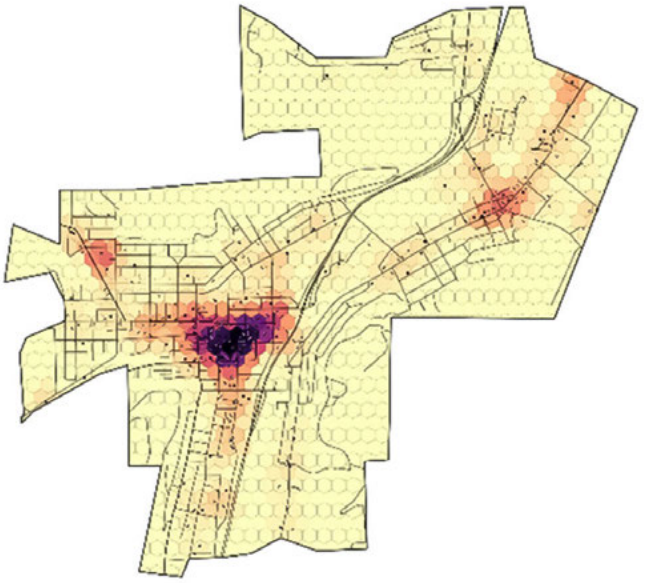
Source: U.S. Census TIGER/Line® file

Exhibit 2 displays Bradford, Pennsylvania, which is the municipality used to demonstrate applying the D3 method. A hexagonal grid is overlaid on the map, with each cell representing an area measuring 100 meters across (approximately 1/16 mile, or one-half the length of an average city block). This map is then used to calculate the business establishment density of each hexagon. Because cell placement is arbitrary—in that the hexagonal grid does not correspond to any real-world positioning and delineation of space—kernel density estimation (KDE) is used to allow each hexagon's density calculation to account for the business establishments in the *surrounding* cells. Doing so captures the spatial relationship of the businesses in the surrounding areas to show the magnitude of business density in a hexagon.

[7] The hexagonal grid, or "honeycomb," is the most efficient way to divide a surface into regions of equal area with the least total perimeter (Hales, 2001). Hexagons also combine more easily to form circles and spheres, which allow them to represent curves in the patterns of data more naturally than do square grids (Esri, 2021b). Although many downtowns are built within a rectangular gridded street pattern, such grids often do not align perfectly with a true north-south-east-west grid, instead following the shapes of rivers, railroads, and other features.

Exhibit 2

Step 1—Relative Density of Business Establishments Plotted



Source: Infogroup U.S. Historical Business Data, 2005

A defining feature of KDE is the ability to freely specify the bandwidth around cells. In other words, the user decides how large a "neighborhood" search area to use when calculating the density of nearby establishments (Esri, 2021a). For instance, a bandwidth of 150 meters (used throughout the demonstration in this article) means that a given hexagon's establishment density is calculated using establishments not only from the area represented by the cell but from an additional 150 meters outward in all directions. Neighboring establishments closer to the cell are weighted higher than those located farther away in the density calculation, resulting in a more precise density map.[8] As with many user-defined parameters of the D3 method, the user must be careful to either ensure that the chosen bandwidth reflects—or attempt to approximate—the extent to which the spatial dependence ceases between a location and its surrounding locations.

The end result of Step 1 is illustrated in exhibit 2, which shows the standardized density (z-scores) of business establishment density in Bradford, Pennsylvania. Local roads are included in the plot to demonstrate that higher density cells are mostly located along a small number of thoroughfares.

Step 2: Grouping Adjacent Cells

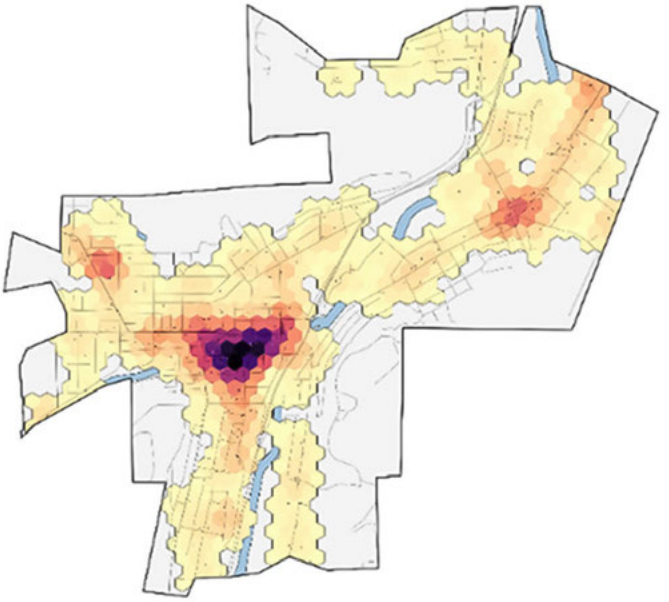
Exhibit 2 shows that a majority of cells have very low business establishment densities, so the next step of the D3 method involves eliminating non-dense cells so that the remaining cells adjacent to

[8] The demonstration in this article used a cell size of 100 meters, a bandwidth of 150 meters, and parabolic kernel function (Epanechnikov, 1969). An average city block is 100 meters long, and the bandwidth was selected to enable a "search" of 1½ blocks outward. All three parameters may easily be adjusted by the user to fit the context of the analysis. For more about kernel density estimation, refer to Silverman (2018).

each other are spatially combined. To do so, the user must first discard all hexagon polygons with a density of zero. This step dramatically lessens the right skew of the density distribution, leaving a map with only those cells that contain, or are near, business establishments (see exhibit 3).

Exhibit 3

Step 2a—Zero-Density Cells Removed



Source: Infogroup U.S. Historical Business Data, 2005

The analyst must then decide how to continue eliminating low-density cells until only the highest density cells remain. Too strict a selection criterion may result in an excessively small delineation of a downtown area that may account only for extremely dense hexagons in an otherwise moderately dense downtown district. Conversely, an overly relaxed selection may result in a downtown delineation large enough that it fails to distinguish between pre-automobile downtown development and its more sprawling automobile-era counterparts.[9] This part of the method is susceptible to the subjectivity and judgment of the user, who must keep in mind some best practices.

Among a wide variety of possible practices, two options reliably reduce all but the densest cells:

- Rank all cell density values into percentiles, keeping only the top 10 percent of cells.
- Normalize all cell density values, keeping only those cells with a z-score higher than 2.

Deciding between the two filtering approaches (or variations thereof) depends on the shape and the spread of establishment density distribution across a given community. As an example, in a

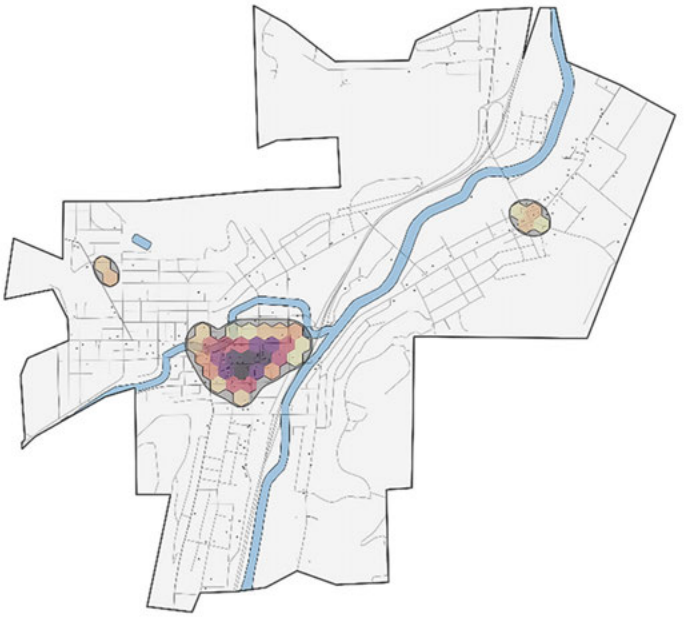
[9] The shorthand of "automobile-oriented development" refers to transportation and land use patterns that are centered around automobile use and convenience rather than pedestrian accessibility. Examples include larger city blocks, statutory parking minimums, wide streets with fast-moving traffic, and a relative absence of public space.

smaller agricultural town, very few business establishments—perhaps only a grocery store, a feed store, and a few gas stations—exist outside the town center. A larger micropolitan town may have several medium-density strip mall shopping centers and big box stores *outside* the downtown business district. Both communities are eligible for use with the D3 method, but the differences in the shape and the spread of the establishment density distribution means that the user should carefully consider which practice will best filter out low-density cells.[10]

Regardless of the chosen filtering option, after eliminating all but the highest density cells, the map should contain only a small number of hexagons. Some of the remaining cells may stand alone, but most will be contiguous with other cells to form a spatially contiguous group. Each group of contiguous cells—including stand-alone hexagons—is spatially combined into a single corresponding polygon with a dissolve operation, and the precise geometric angles of the hexagonal borders are replaced with smooth, rounded edges (see exhibit 4).

Exhibit 4

Step 2b—Highest Density Cells Only, Adjacent Cells Grouped



Source: Infogroup U.S. Historical Business Data, 2005

Step 3: Selecting the Downtown Grouping

The final step of the D3 method requires the user to determine which of the remaining cells constitute the downtown district. Step 2 generates one or more polygons from the spatially combined hexagons that represent the agglomeration of business establishments in various

[10] The author recommends that analysts performing a "batch" implementation of this technique (for example, delineating downtown for all non-metropolitan municipalities in one state) divide the operation into smaller subsets according to population and rurality.

areas throughout the community. As in Step 2, the user must consider multiple elements when determining which grouping or groupings to use for the final downtown geography delineation to save as a layer.

The first consideration is whether the community is polycentric or monocentric.[11] If the latter, then the largest grouping most likely contains downtown; however, the second consideration—the establishment density—may complicate the picture. The largest grouping may comprise mostly establishments in low-density, automobile-oriented development. The highest density grouping may also comprise establishments in automobile-oriented (i.e., not downtown) development.[12] The analyst should thus take both size and density into consideration when determining how to group the hexagons to represent a downtown district or districts. The following are two practical approaches:

- Rank groupings in descending order according to both size and establishment density. Sum both rankings, and rank the resulting sums. The highest ranked sum or sums likely contain the downtown business district.

- Omit establishments from industries with a tendency for satellite agglomeration (e.g., hospitals, doctors' offices, and other businesses in a medical campus) on the periphery of town.

If, however, the analyst is aware of a second historic business district within municipal boundaries, implementing Step 3 of the D3 method may be challenging. Such places may be difficult to identify. Although these areas possess the building density and streetscape characteristics of a traditional pre-automobile business district, they often are positioned much lower within the hierarchy of shopping districts in the community. Despite the historic character of the buildings, vacancy is common among storefronts in secondary historic business districts; thus, although building density is high, establishment density remains low, and the secondary business district may not be identified by the kernel density mapping from Step 2 because the bandwidth setting is not set to reflect that relationship. In such cases, two options may be pursued:

- If the secondary historic business district is close enough to the primary downtown district, the buffer zone around each may be increased, allowing those hexagons to be merged into a single downtown business district.

- If the secondary business district is not close enough to merge with downtown via buffering, the analyst may consider manually selecting polygons from the map generated in Step 2. Sometimes a qualitative review is needed to capture reality in ways that spatial techniques are unable.

After selecting the hexagon grouping or groupings pertaining to the community's downtown district (see exhibit 5), all other groupings and individual hexagons may be deleted from the layer (or saved

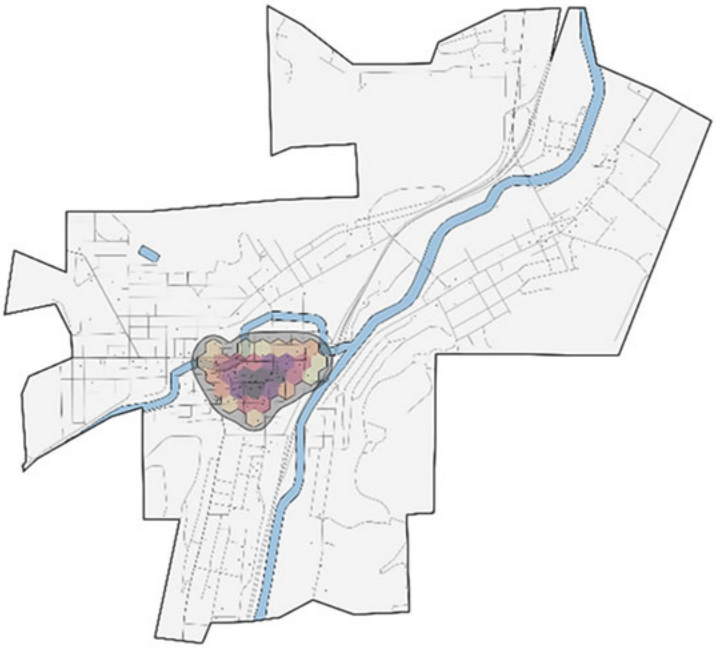
[11] As suggested by the name, *monocentric* cities and towns have only one central location; however, in some circumstances, multiple nuclei will emerge, corresponding to different sources of economic and civic activity in the community (such as a town with a courthouse square district and a separate business district adjacent to a waterfront or rail station). The latter category is referred to as *polycentric*.

[12] The latter possibility—an area that contains high establishment densities but is not located in a pre-automobile business district—is likely to be identified in areas where establishments are concentrated around a single anchor, typically a hospital or college campus.

to a new layer for later use). Because the resulting set of hexagons (or squares) does not perfectly map onto the actual location of streets and establishments in real life, the use of either cell shape introduces some degree of error into the process. A modest buffer operation may help to correct for this error, allowing the district to expand enough to encompass those parts of downtown that were narrowly uncaptured by the delineation process.[13] The final map (see exhibit 6) shows the City of Bradford, Pennsylvania, with a polygon that corresponds to its downtown district.

Exhibit 5

Step 3—Downtown Grouping Selected, Buffer Operation (50m) Applied

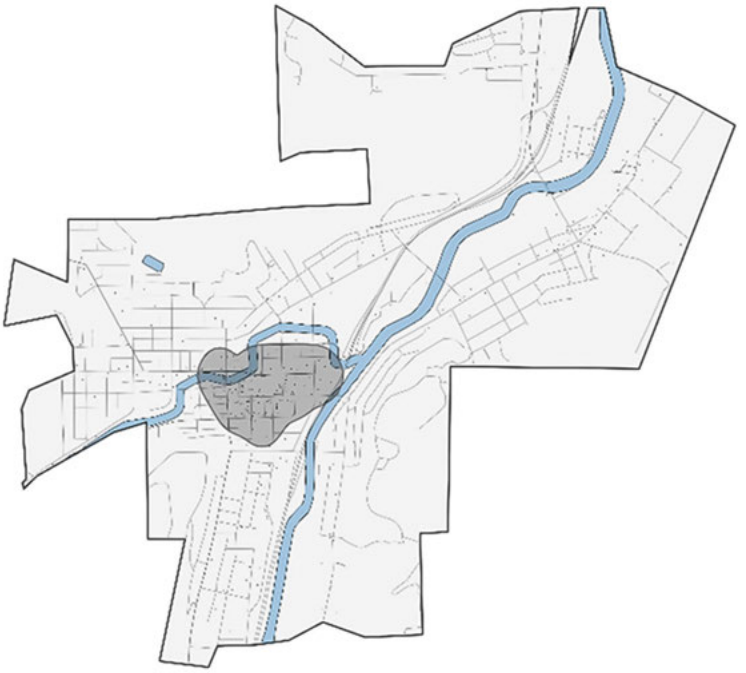


Source: Infogroup U.S. Historical Business Data, 2005

[13] In addition to performing the optional buffer operation, the user may tweak several additional parameters in the D3 method to suit the study context. Those parameters include cell size, bandwidth, density percentile threshold (if using percentiles), z-score threshold (if using z-scores), number of groupings, grouping average density threshold, grouping size threshold, and specific North American Industry Classification System industry codes to keep (or omit) from the kernel density estimation. Each of those parameters is discussed in the previous text.

Exhibit 6

Final Downtown District Delineation



Source: Infogroup U.S. Historical Business Data, 2005

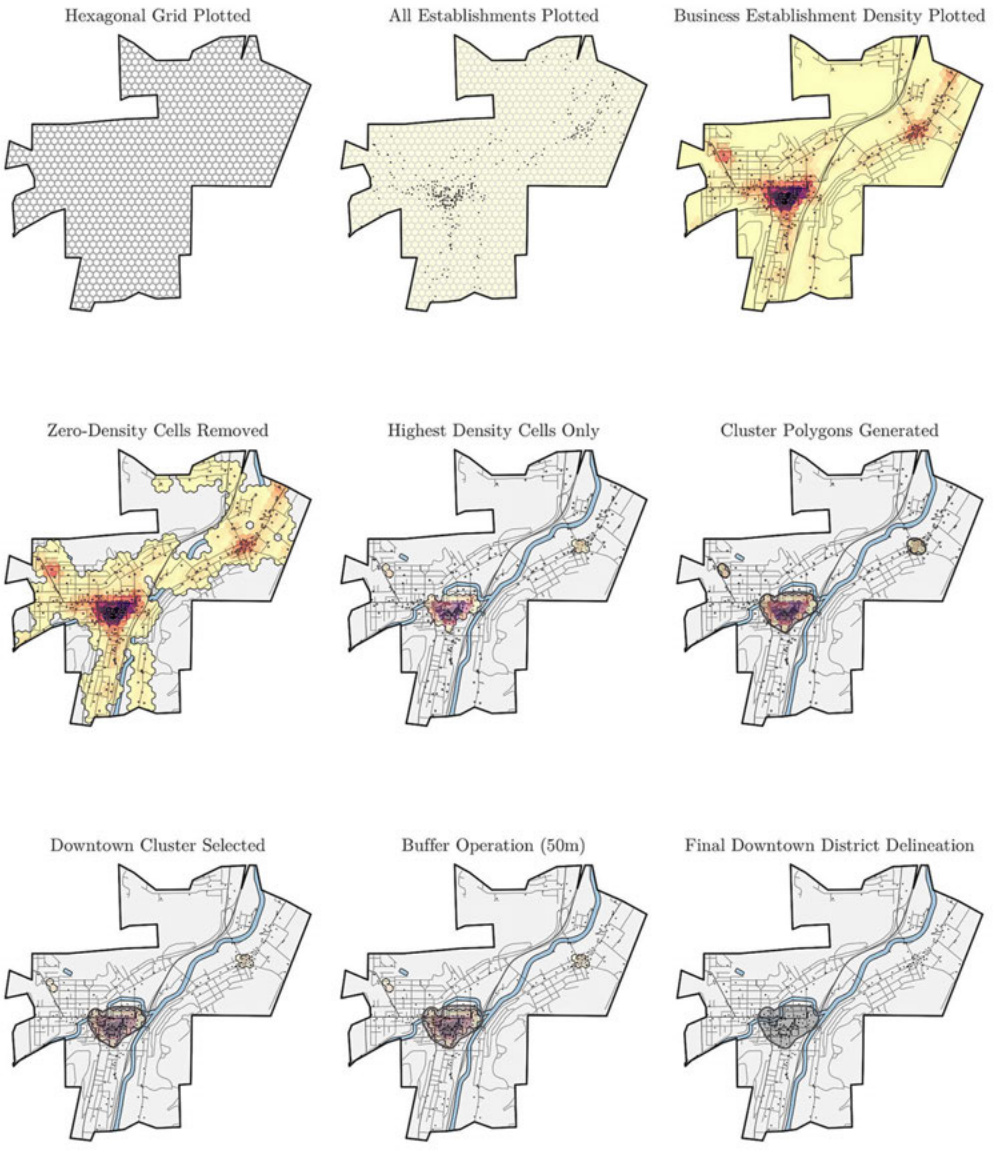
Implications and Potential Uses of the Data

The method described previously—see exhibit 7 for a step-by-step illustration of the entire method—provides practitioners and researchers with consistent, data-driven delineations of downtown district boundaries.[14] Following are three reasons why the D3 method represents an improvement over existing analytical practices involving the identification of "downtown" as a spatial unit.

[14] Although the method is data driven, many of the necessary parameters are defined according to the user's discretion.

Exhibit 7

Full Step-by-Step Illustration of D3 Method



D3 = downtown district delineation.
Source: Infogroup U.S. Historical Business Data, 2005

First, accurate downtown district delineations are crucial when evaluating downtown economic revitalization strategies. Even when fully effective, such strategies are unlikely to generate their intended outcome geography evenly throughout an entire community. Rather, the outcome geography being evaluated should, in theory, be most concentrated in and adjacent to downtown. As shown in a study of downtown revitalization in the rural Midwest (Van Leuven, 2021),

communities participating in the "Main Street Program" benefited from new job growth in their downtown district.[15] When the study area was enlarged outward beyond the downtown district, however, no statistically significant increase in job creation was detected. It is imperative that researchers have a correct definition of a given community's downtown district with which to measure and evaluate the efficacy of a revitalization strategy.

Downtowns also serve as a relevant source of heterogeneity that must be accounted for in analyses of housing and real estate markets. A common empirical strategy in such studies—hedonic price modeling—estimates the implicit prices of relevant amenities and disamenities by accounting for local price heterogeneity in the housing market (Rosen, 1974). Although most hedonic price models account for property-level characteristics, such as square footage and number of bathrooms, controlling for local neighborhood characteristics is likewise necessary to gauge the true value of variables in the model. The use of a "distance from downtown" variable in hedonic price analysis is ubiquitous, appearing in studies ranging from transportation planning (Seo, Golub, and Kuby, 2014) to natural resource economics (Lansford and Jones, 1995).

The lack of a data-driven delineation of the downtown district introduces two potential weaknesses:

- *Use of the "centroid" of the downtown district.* Lacking a proper polygon to delineate where downtown begins and ends, many studies calculate the distance to the center. This method can be problematic if the downtown district is not symmetrical (e.g., a downtown that follows a single corridor) or if the central point of the municipality does not correspond with the community's dense business district.

- *Use of a predefined downtown district.* As mentioned earlier in this paper, many cities have already defined their downtown district; however, those definitions limit researchers from studying places without predefined GIS boundaries that represent the area intended to be studied. Administrative downtown boundaries may also be arbitrarily defined, based on political constituencies or colloquial perceptions of downtown, rather than a representation of the density of economic activity.

Finally, the D3 method allows for a continual recalibration of a community's downtown district, allowing it to evolve over time. Although the epicenter of a community's downtown district is not likely to shift dramatically away from its historical roots, the size and shape of a central business district may fluctuate on the basis of regional circumstances and overall macroeconomic trends. For a state or county economic development agency attempting to keep track of the economic health and trajectory of its constituent communities, a new downtown district boundary could be generated every half decade, using the geometric average of 5 years' worth of downtown delineation files.[16] Those revised boundaries would allow policymakers and analysts to stay up to date with an accurate conception of the central business district when evaluating and observing downtown economic activity.

[15] This finding was identified only for communities in the state of Iowa. For the other states in the analysis, results lacked statistical significance.

[16] Year-over-year changes in the downtown's size and shape should be regarded as statistical noise, but when aggregated over time, multiple years of data will convey a more accurate definition of downtown.

Conclusion

When used carefully, the downtown district delineation (D3) method is a useful tool for any analyst needing to differentiate between a municipality's central business district and its other commercial spaces. Whereas the parameters of D3 are highly customizable, its core function is to identify a municipality's densest (and typically most central) business district. Larger cities typically already possess a detailed spatial delineation of their downtown district, and suburban or exurban municipalities typically lack a downtown business district. This method thus targets primarily practitioners in—and researchers of—smaller non-metropolitan communities with a central business district established before the automobile era.

Acknowledgments

The author thanks Bill Ryan and Karina Ward from the University of Wisconsin-Madison Extension Center for Community & Economic Development for their feedback during the early development of this methodology.

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